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NOTES AND KEYS ON THE GENUS *BROCHYMENA* (PENTATOMIDAE, HETEROPTERA)

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The genus *Brochymena*, established by Amyot and Serville in 1843, is a New World representative of the tribe *Halyini*. When the genus was erected there were few species known that could be placed in it. These had previously been assigned to the different genera, *Cimex*, *Halys*, and *Pentatoma*. Since that time a considerable number of new species have been described so that today there are twenty-four recognized ones and two varieties. Keys of various proportions and values have been made at different times for the determination of these species. The most complete keys are those published by Van Duzee in 1904 and by Bueno in his *Synopsis* in 1939. Almost as many species have been described since 1904 as had been known up till then and several new species have been added since 1939. Since the Bueno key is not all inclusive and has limitations (it was meant for the student who would already be familiar with the limits of variation of each species) it was thought best to re-write the taxonomy of this genus and add to it many comments of interest to the general entomologist. The keys that follow include those species also that occur beyond the national limits of the United States. It is hoped that the completeness of this work will be an incentive toward writing up other pentatomid genera in a similar way.

THE GENUS

The genus is a very unified one and forms one of the most natural subdivisions of the family Pentatomidae. The peculiar color pattern and design found on the elytral membrane led Amyot and Serville to use the name *Brochymena* (from the Greek to mean "flecked-wing") and to set this group of insects off from all others in the family. The arborescent and vermiculate dark markings on the membrane are present in all members of the genus (though they may be pale and obscure, at times, in *B. pilatei* Van D.) in contrast with the absence of them in other genera, tribes and subfamilies of New World Pentatomidae. Besides this character the genus shows individuality in the structure of the head, the length of the antennae, the presence of a midventral abdominal furrow, and in the structure of the genital cup of the male.

The head (Fig. 1) is quite elongated with straight or weakly sinuate edges. There is an obvious subapical tooth (SAT) on the lateral edge of each jugum (JUG); such a tooth may, at times, be large [*B. arborea* (Say), Fig. 22] or small (*B. lineata* Ruck., Fig. 1), acutely angled (*B. affinis* Van D., Fig. 40) or appear merely in the form of an obtuse crenulation near the apex of the head (*B. punctata* Van D., Fig. 29). For the most part the disc of the head is coplanar, though there are a few cases where it is irregularly impressed at various points giving an undulated appearance to its upper surface. Usually the ground color of the head, and that of the rest of the body as well, is some shade of yellow or brown, ranging from pale testaceous to dark fuscous; occasionally reddish tones also are present. Both the dorsal and ventral surfaces of the head and body are punctured with contrastingly darker brownish to piceous pits of various sizes. Sometimes these punctures form a definite design although more often no evident pattern is discernible. The punctures and pits are always more numerous and larger on the dorsal side of the individual.

The antennae are long and slender, always at least, as long as the head and thorax combined and usually longer; they are inserted in a crateriform pedicel on the side of the head, below its jugal border and some distance in front of the eyes. The proportionate lengths of their respective segments are, in some instances, valid characters for the segregation of species, although I have found that this is not as constant a character as could be desired.

The ventral surface of the abdomen is invariably sulcate or provided with a shallow median furrow to receive the long beak; this

longitudinal furrow is evident through, at least, the fourth visible segment and then evanescent posteriorly. The beak reaches beyond the metacoxae and beyond the middle of the third (second visible) segment. Its tip and most of the last joint are always dark fuscous to piceous.

In the male the genital cup, so called because it is partially globular like a slightly elliptical, diminutive bowl, does not have the ventral lip elongated as in the genus *Euschistus* nor is the ventral border sharply upturned as in many genera of pentatomids, such as *Thyanta*. Rather, the edge is shallowly inflexed or weakly up-bent, leaving most of the contents of the segment visible from the posterior and dorsal aspects. The edge of the ventral lip is frequently provided with lateral lobes, excavations here and there, and small crenulations, so that transversely it presents a broken border. In this genus the claspers or parameres (Figs. 2-7, 15, 18, and 20) are unusually large and heavy with a stout basal arm and hook-like or lobate terminal head. In one group of species the ventral hook or ramus of the head of each clasper (Figs. 2, 15, 18, 20) overhangs the lower lip of the cup. The proctiger likewise is quite large and as in other pentatomids covers the aedeagus when the males are not participating in the copulatory act.

The pair of stink glands, as in other pentatomid adults, open on the metasternum just posterior to the cephalic edges of that segment and about midway between the metacoxae and the lateral margins of the plates. In one subdivision of the genus the orifice of the gland is not provided with a laterally extending auricle or canal but opens directly on the surface of the metasternum; in this case there is no evaporating area around it. In the other subdivision the orifice is slightly raised on a prominent crateriform base to which is appended a tongue-shaped laterally extending auricle acting as a distributing canal; this frequently has a partial spiral twist to it. Ordinarily the crateriform base and auricle are raised from the surface of the metasternum and contrastingly colored against a paler rugose or pebbled subtriangular evaporating area; the latter almost completely surrounds the orifice, base, and auricle.

RELATIONSHIPS BETWEEN SPECIES

To arrange the species of this genus in a phylogenetic order would be more or less a hazardous undertaking at this time. Considerably more knowledge relative to the geographic distribution, habits, food plants, life cycles, rate of mutations, extent of inter-specific hybridization, etc., is needed before a definite evolutionary

history can be properly established. Basing a phylogeny solely upon differences and similarities of a morphological nature would be inconclusive. However, structural evidence shows that certain natural relationships do occur and that these relationships are constant.

Within this genus no student will question the fact that large natural divisions can be established on the basis of the structure of the humeri, claspers, and metasternal orifices. The author has therefore broken the genus down into three GROUPS, or complexes. The first of these is the weakest subdivision since it consists of only one species of which the known individuals are all females. This is called the *cuspidata* GROUP, typified by *B. cuspidata* Dist. In this species the humeri are very distinctive and unlike those of any other species of *Brochymena* known, in that they are subconical and prolonged into a cuspidate process (Fig. 8). The other two GROUPS of species are strikingly in contrast with one another and the preceding and form two natural subdivisions. The *arborea* GROUP typified by *B. arborea* (Say) and including the following species: *arborea*, *haedula*, *aculeata*, *apiculata*, *poeyi*, *barberi* (and var. *diluta*) and *florida*, is characterized by the presence of quadrilateral humeri with strong teeth (Fig. 9), a metasternal orifice opening directly on the plate, without a crateriform base or auricle or pebbled evaporating area, and claspers, the heads of which are mattock-shaped (Figs. 2, 15, 18, 20), with the lower arm or ramus projecting over the lower lip of the genital cup. The *quadripustulata* GROUP, typified by *B. quadripustulata* (Fabr.) and including the following species: *cariosa*, *lineata*, *parva*, *quadripustulata*, *pilatei*, *sulcata*, *dilata*, *punctata*, (and var. *pallida*), *tenebrosa*, *humeralis*, *carolinensis*, *marginella*, *myops*, *affinis*, and *hoppingi*, is characterized by the presence of triangular humeri (Fig. 10) usually with small retrorse teeth, a metasternal orifice on a crateriform base, with an auricle and surrounded by a pebbled evaporating area (Fig. 24) and claspers, in which the heads are not mattock-shaped but which are provided with horizontal or up-turned hooks or laterally expanded lobes (Figs. 3-7) which never overhang the ventral lip of the genital cup.

There is apparently greater homogeneity between the species within the *arborea* GROUP than between those of the *quadripustulata* GROUP, there being less structural variation and dissimilarity between the seven species of the former.

Using the structure of the claspers alone as the basis for further analysis, we find that the *quadripustulata* GROUP can be subdivided into four lesser categories, as four distinctive types of claspers exist.

One type can be called the *cariosa* type (Fig. 4), another the *punctata* type (Fig. 5), a third the *carolinensis* type (Fig. 6) and a fourth the *affinis* type (Fig. 7).

Those species possessing claspers similar to but not identical with those of *cariosa* are *lineata*, *parva*, *quadripustulata*, *pilatei*, and *sulcata* (Fig. 3). These species are arranged in their ascending order of specialization of clasper patterns, *cariosa* being the simplest without any excrescences, *sulcata* bearing a prominent flaring lobe and dorsal hook on each clasper.

The species with the *punctata* type are *dilata* and *punctata* in which the head of the clasper terminates in a large block-shaped lobe (Fig. 5) which is somewhat semicircular in *dilata*, distinctly squarish in *punctata*, and provided with a pair of blunt crenulations on the upper edge of both between which a weak saddle appears. This head is set at almost right angles to the long axis of the stout basal arm of the clasper. These two forms may have been derived from the *cariosa* type; if so, then *dilata* is the closer relative to that type.

The *carolinensis* form of clasper is found in *tenebrosa*, *carolinensis*, *marginella*, and *myops*. In this type (Fig. 6) the terminal part of the clasper is bent at an obtuse angle to the axis of the basal arm but lies laterally rather than vertically in relation to that axis in contrast with either of the two preceding types. The species *B. humeralis* is unfortunately known only from the female types, but other structural characters consistent with the facies of the above mentioned species suggest that that is a natural relative of these and hence is included with them in this category.

The species *affinis* and *hoppingi* have claspers that may have been derived from the *carolinensis* type but the differences are sufficiently great to set them off in a distinct category. These claspers resemble diminutive and abortive horns or antlers of the pronghorned antelope with the long axis of the horizontal arm gradually curved upward and outward and terminating in two short blunt prongs (Fig. 7).

All in all there probably is a definite phylogenetic relationship between all these species, but nothing more definite than the above summary can be established at the present time, nor can clearer and more exact lines of descent be indicated. Clasper patterns are, by themselves, criteria of too minor value upon which to found far-reaching conclusions.

FOOD AND HABITS

The species of *Brochymena* are primarily herbivorous, although a number of instances of their using animal food have been men-

tioned by competent observers. Luggler (1900) reports that the late Prof. Uhler observed that *B. quadripustulata* is a great enemy of caterpillars and other insects; Hart (1919) says that *B. arborea* has been pictured feeding on Colorado potato beetle grubs, and Sander-son reports *B. quadripustulata* attacking tussock and brown-tail moth larvae. I have seen a nymph of *B. quadripustulata* impale a small lepidopterous larva on its beak. This, however, is not a commonly observed act. The beak is long and slender, adapted for piercing plant tissue and not the strong, stout type characteristic of truly predatory forms of pentatomids; it is apparently unsuited for consistent attack on small, albeit soft-bodied larvae.

In a note (1941) on the feeding habits of *B. carolinensis*, I have described how the beak is partly folded in a zig-zag manner when being inserted into the bark of a tree. It appears that the beak never penetrates very deeply beneath the surface of the object upon which the insect is feeding; even when piercing such soft, fleshy objects as apples or other fruits only a small part of the terminal segment passes through the skin of the food. The stylets penetrate a great deal deeper than the sheath of the beak to reach the available food supply.

For the most part the adults may be found during the summer months on a great variety of shrubs and trees, usually running up and down the trunks and smaller branches. They are by no means restricted to conifers as many older students of the genus and other observers were led to believe. During winter months the rough conifer bark furnishes excellent refuge for the hibernating adults but these insects do not necessarily feed on such plants. In New Mexico I have observed *B. sulcata* Van D., in abundance, feeding on trunks of mulberry (*Morus rubra* Linn.) and honey locust (*Gleditsia triacanthos* Linn.); I have likewise taken them from apple and found them abundant in fields, though not feeding there. In the Great Smoky Mountains of Tennessee, *B. quadripustulata* (Fabr.) was taken in quantity while feeding from the stems of stag-horn sumac (*Rhus typhina* Linn.). In this case the bugs tend to congregate in the crotches of the stems and feed from the axils of the compound leaves. This species is also recorded as living on elm, grape, cherry, apple and mountain ash (*Sorbus americana* Marsh.). In the Jemez Mountains of New Mexico, *B. hoppingi* Van D. was commonly found on the trunks of yellow pine (*Pinus ponderosa* Englm.) and in Arizona the late Dr. E. D. Ball said he found *B. lineata* Ruck. feeding on the white-leaf oak (*Quercus hypoleuca* Englm.). On the open mesas of the southwest, where mesquite (*Prosopis glandulosa* Torr.)

abounds, *B. parva* Ruck. is commonly found crawling and feeding on the branches. Provancher states that his *B. 4-notata* (*B. myops* Stål) was taken from sweet gum (*Liquidambar styraciflua* Linn.). In the pine barrens of New Jersey, *B. carolinensis* (West.) is known to feed on pine. In Florida this species occurs in large numbers on the trunks of long-leaf and slash pines (*P. palustris* Mill. and *P. caribea* Morelet) where it may be found actively feeding through the thinner bark. Hart reports that *B. arborea* (Say) has been found on willow, apple, peach, pear; this species also feeds on black-jack oak (*Quercus marylandica* Muench.) from which specimens collected in Virginia were taken.

BREEDING AND OTHER HABITS

During the winter months the adults hibernate and many may readily be taken from under the bark of standing tree stumps and among the debris in copses. For the most part there is apparently only one generation a year, at least in the northern states. The adults mate and lay their eggs sometime after their recovery from hibernation; the nymphs take a goodly part of the summer months to complete their cycle. In more southern regions, *B. sulcata* Van D. in New Mexico and *B. carolinensis* (West.) in Florida, may have two generations; at least that is surmised from the recorded dates of the matings of the first generation adults; this takes place between the end of July and the middle of August. How soon the eggs are laid after copulation is not known, but it seems unreasonable to assume that these inseminated females, in such warm climates, would then hibernate and retain their eggs until the following year; in all probability oviposition occurs soon after completion of mating. The new generation thus reaches maturity about the end of September or mid-October and proceeds to winter over in the adult stage. Dr. J. R. Eyer of Las Cruces, New Mexico, tells me that he has taken such dormant adult specimens of *B. sulcata* Van D. from under field breeding cages, clapboards of hen houses and dilapidated dwellings, where the bugs sometimes appear in sufficient abundance to become nuisances.

Copulation, certainly in some species, occurs during the day time. The activities during mating in *B. sulcata* Van D. have been described in a short note some years ago (Ruckes, 1938). Whether or not all species follow the same sequence of steps in their respective acts is not known, but all species apparently conform to the general hemipteran pattern in respect to the position assumed during the mating process. That is that, after the male has mounted

on the back of the female and succeeded in inserting his genital organs into the receiving valves, he dismounts and remaining in copula, faces in the opposite direction to that assumed by the female so that the two individuals are in line with their posterior ends in union.

In general the species of this genus are active only during the daytime while they feed or sun themselves. I have found but few records of their capture during the night and analysis of "catches" from trap-lights fails to show that they are attracted in any abundance by lamps. Even in regions where individuals are abundant, as in Kansas, southern New Mexico and central Florida, I have consistently been unsuccessful in finding them attracted to neon lights which are veritable gold mines for collecting other kinds of pentatomids. During some summer seasons past I have had the opportunity of analyzing the trap-light "catches" that have been recorded from many points in Kansas and Nebraska, a project established by the Kansas State College at Manhattan, Kansas. Of all the thousands of insects caught in this manner I have never procured one specimen of any species of *Brochymena*, but other pentatomids have occurred in abundance. Mr. Bueno tells me that a common species (*B. parva* Ruck.) in the vicinity of Tucson, Arizona, has been taken in some numbers at lights in that city.

DISTRIBUTION

As has been stated in the opening paragraph the genus *Brochymena* is a New World one extending from the nearctic region southward into Central America. As yet it has not been recorded from South America, but is known to reach into southern Costa Rica. Unfortunately there is a paucity of material collected from Mexico and Central America. Furthermore, many of the specimens in collections, even those used as types for species, merely bear a label inscribed "Mexico," "Guatemala," without stating at what collecting station the specimens were captured. We must realize that the area occupied by Mexico and Central America is truly enormous; the greatest distance from the United States border along the Pacific coast to the Canal Zone is about 3500 miles, while that on the Gulf side is well over 1500 miles. There is reason to believe that a genus like *Brochymena* would do in the tropics what other pentatomid genera do there, and that is proliferate in the number of species; yet relatively few are recorded from this entire territory. The author feels rather certain that as more intensive collecting is done in this zone many new species in this genus will be discovered.

The majority of species recorded come from the United States, Canada, and northern Mexico. *B. cuspidata* is known only from Costa Rica; *B. aculeata*, *B. haedula*, *B. humeralis*, and *B. tenebrosa* are recorded from southern Mexico, while *B. poeyi* comes from the West Indies, particularly Cuba.

Of the known species some have a wide distribution while others are very limited. Aside from the lack of knowledge due to faulty collecting, the limitations are probably prescribed by the relative abundance of food plants, although this is not the only factor involved. Climatic conditions which determine the length of breeding seasons is certainly one that cannot be overlooked. Parasites and predators apparently play a minor role in limiting the spread of species.

B. quadripustulata appears in most States of this country, is frequently taken in Canada and is recorded from northern Mexico. Its wide distribution may be accounted for by the fact that as a species it has the greatest variety and widest distribution of its food plants. In contrast *B. punctata* appears to be limited to Virginia, the Carolinas, Georgia, and Florida, although Blatchley claims to have taken it in Crawford County, Indiana. *B. carolinensis* is not known definitely from territory west of the Allegheny Mountains in the North but extends westward to eastern Texas through the Gulf States in the South. *B. affinis* seems to prefer the northwestern portion of this country inhabiting Washington, Oregon, Idaho, etc.; *B. parva* prefers the country of the chaparral, *i.e.* the mesas of Texas, New Mexico, Arizona, Colorado, Utah, Nevada, and southern California. The Mississippi Valley and the Plains belt from Nebraska and Illinois southward to the Gulf States, thence easterly to Florida is the range inhabited by *B. cariosa*.

Some species overlap one another in their distribution while the geographic limits of others are very clear cut. By numerical abundance one can easily recognize that in two adjacent areas a western species replaces a more eastern one of close relationship; thus *B. sulcata* throughout the southwest (New Mexico, Arizona, California, Colorado) takes the place of the abundant *B. quadripustulata*, a very close relative, in the eastern States. Similarly *B. hoppingi* is a southern replacement of the more northern *B. affinis*, likewise a very close relative.

Van Duzee in his Catalogue (1917) has already given an extensive list of places from which each of the then known species had been recorded as of that date. In the present paper new localities are listed as they have now become known.

DESCRIPTIONS

In making up notes and descriptions of the various species a definite order has been followed; characteristics of the various parts are given in the following sequence: the general shape and appearance (facies), the head, the pronotum, the scutellum, the elytra, the connexivum, the ventral aspect of the head, the antennae, the thoracic sterna and pleura, the abdominal venter and the genitalia of both the male and female where possible.

In many of these descriptions the repeated mention of certain characteristics may suggest redundancy and by some thought to be unnecessary. However, I have only too often found that the omission of a statement concerning the nature, the presence or absence, of a certain characteristic to be a weak point in descriptions, and often results in uncertainty of species determination. The fact that the same characteristic appears in more than one species is no reason for omitting the mention of that fact from descriptive statements. I am sure, from experience, that a student may be puzzled as to whether or not the identical character appears in several different species. If that fact is not mentioned in the descriptions he is frequently at a loss to proceed with his identification.

Since the phenomenon of variation is so invariable, different individuals of a species are bound not to conform in all respects to any single character. It becomes necessary therefore, for the student of any species, genus or larger taxonomic category to become familiar with the range of structural and physiological variation within his special group. Only by dint of comparison of a goodly number of specimens of any species can the worker be certain of his identifications.

Altogether several thousand specimens of this genus have been examined during the past few years. The following keys, while artificial in some respects, have been constructed with a view of showing some possible genetic relationship between species. With the aid of Fig. 1 the salient characters used in identification are illustrated. For the most part color, as a characteristic, has been minimized (except in the case of *B. pilatei* where it is relatively constant), because of its variability and because specimens frequently tend to change their color during preservation and sometimes become concolorous after long periods of time. Relative lengths of antennal segments is a character not as dependable as could be desired. Every so often an individual will not conform to specifications as is well illustrated in examples of *B. carolinensis* sent to the British Museum for comparison with Westwood's types.

Mr. W. E. China states "while all other characteristics indicate the examples to be this species there is a distinct discrepancy in the linear ratios of antennal segments." The same is true of one or two specimens I have seen of *B. cariosa* and have compared with the Stål types; in this instance segments two and three are subequal instead of segment two being the longer.

The genus is a rather difficult one to analyze and systematize; since it becomes necessary to understand the principle of species variation and species limitations, the keys have been constructed by using combinations of characters, so that if the first mentioned does not fit exactly one or two of the others will. Some species are more stable and clear cut than others. Chromosomal numbers have not been used as they have in certain other genera, such as *Thyanta*, *Euschistus*, and *Edessa*, to demark species lines. In the future if this be done with *Brochymena*, some of the present species may be subdivided while others may be placed in synonymy and consolidated.

In the following taxonomic portion of this treatise all of the original descriptions of the various species have been brought together and included directly after the library references relative to each species.¹ Where the original description has been in some language other than English, a translation, constructed as accurately as possible to convey the intent of the original author, is given. Hereafter then, a student of this group need not be handicapped by the lack of library facilities to procure information pertinent to the original descriptions. Considerable time and energy can thus be saved.

Every attempt has been made to include as many pertinent data as possible concerning the nature of the type specimens, paratypes, type localities, place where the type is or had been deposited, the food plants, and the general distribution of each species. It is the hope of the author that such treatment may consolidate our knowledge of this genus and that other genera may, in the future, be worked over in a similar manner and all facts concerning them be made available.

ACKNOWLEDGEMENTS

At this time I wish to state that I am greatly indebted to the authorities of the Riksmuseet, Stockholm, Sweden, especially to M.

¹ In the following pages species names prefixed with † are cases of wrong identification. Homonyms are prefixed by ||. Synonyms are not prefixed by any sign.

Rene Malaise, for the loan of the Stål types which were so willingly sent me from their collections. To Mr. W. E. China of the British Museum, London, I owe the notes and drawings of the types in that institution. I wish also to thank Mr. J. R. de la Torre-Bueno and Mr. H. G. Barber for their assistance. To the late Mr. E. P. Van Duzee I owe the initial encouragement and incentive to study this difficult genus. Appreciation is also expressed to Dr. R. L. Usinger for material collected by him in Mexico. Collections of a goodly number of State Colleges and Experiment Stations were freely and ungrudgingly loaned for examination as were private collections made by numerous professional entomologists. I hereby acknowledge my indebtedness to those of the respective staffs who so willingly cooperated and to all my friends and acquaintances who loaned material for examination.

DRAWINGS

All drawings of legs, humeri (except Fig. 8), pronotal margins, abdominal margins, and heads (except Fig. 17) were made by means of a camera lucida attached to a binocular microscope. The magnifications have thus been kept the same. The claspers (except Fig. 18) were drawn through the camera lucida and a compound microscope. Figs. 15 and 20 are about twice the enlargement of Figs. 2-7. Fig. 1 is a tracing from a projected photograph of the type specimen of *B. lineata* Ruck.

Figs. 8, 17, and 18 are from original sketches made by Mr. W. E. China of the British Museum.

Genus *BROCHYMENA* Amyot and Serville 1843

Haplotype: †*serrata* Am. and Serv. = *quadripustulata* (Fabr.)
Amyot and Serville, Histoire Naturelle des Insectes: Hémiptères,
p. 106, 1843.

Spinola, Tavola Sinottica, p. 31, 1850.

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Van Duzee, Trans. Amer. Ent. Soc., v. 30, p. 26, 1904 (Key).

Van Duzee, Cat. Hemip. N. A.; Univ. Calif. Pub., v. 2, p. 29, 1917.

Hart, Pentatomoidea of Illinois, p. 172, 1919 (Key).

Stoner, Scutelleroidea of Iowa; Univ. Iowa Studies; v. 8, No. 4, p. 55, 1920 (Key).

Blatchley, Heteroptera Eastern N. A., p. 95, 1926 (Key).

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 201, 1939 (Key).

Tête ayant le bord antérieur plus ou moins finement échancré à la jonction des lobes latéraux, qui dépassent le lobe median. *Bec* dépassant plus ou moins le métasternum. *Prothorax* à bords latéraux fortement crenelés, ses angles postérieurs assez fortement saillants. *Élytres* (membrane des) à nervures fourchues, formant des cellules ou figures irrégulières. Tous les autres caractères sont ceux de *Halys*.

Translation

The apex of the head more or less minutely notched at the union of the lateral lobes, which exceed the median lobe. Beak more or less passing the metasternum. Lateral borders of the thorax strongly crenulated (toothed), the posterior pronotal angles strongly produced. The membrane of the elytra with branching (arborescent) nervules (markings) forming small cellular patterns or irregular figures. All other characters are those of *Halys*.

Comments

The details of the above characters have already been given in the introductory pages under the heading of THE GENUS.

SPECIES OF BROCHYMENA

The genus can be divided into three GROUPS of species as follows :

- 1) Humeral projections of pronotum acutely produced into a prominent acuminate process; basal third of scutellum gibbous with two distinct lateral elevations with a weak saddle between them; basal valves of female genital plates tumid with their posterior faces declivent and slightly excavated; distal third of fore tibiae strongly dilated.

Male specimens unknown.

cuspidata GROUP (p. 157)

This GROUP as yet is monospecific, represented only by *B. cuspidata* Dist.

- 2) Humeral projections of the pronotum subquadrate, prominently toothed; basal third or fourth of scutellum distinctly elevated, almost gibbous with or without a weak

saddle; male genital cup without the ventral lip appreciably upturned, the contents visible from posterior aspect and claspers totally evident; claspers always with a ventrally projecting hook or ramus which overhangs the ventral lip of the cup; basal valves of female genitalia appear as more or less tumid plates with declivent posterior faces usually broadly bordered with a band of fuscous; metasternal orifice merely an inconspicuous pit without an auricle or canal of any kind, or the auricle exceedingly diminutive, almost invisible and no pebbled or rugose evaporating area present; the marginal fuscous band of the elytral membrane either obsolescent, incomplete, or wanting.

arborea GROUP (p. 157)

This GROUP includes the following known species: *arborea*, *florida*, *haedula*, *poeyi*, *apiculata*, *aculeata*, *barberi* (and *barberi* var. *diluta*).

- 3) Humeral projections subtriangular with small teeth, rounded or otherwise but never subquadrate with prominent teeth or subconical with cuspidate process; basal third or fourth of scutellum hardly elevated; ventral lip of male genital cup somewhat produced and weakly upturned so that claspers are obscured in part and only their distal ends are visible from the posterior; each clasper with only a dorsal or laterally projecting hook or lobe which, if exceeding the margin of the cup, overreaches the dorsal and never the ventral lip; basal valves of the female genitalia never strongly convex or tumid, usually flattened and not declivent behind, and not broadly bordered with fuscous; metasternal orifice raised on a crateriform base to which is appended a distinct laterally extending auricle, this sometimes with a spiral twist to it; a dull subtriangular pebbled evaporating area surrounding the orifice, base and canal; the marginal band of the elytral membrane usually very distinct and complete in various shades of fuscous.

quadripustulata GROUP (p. 177)

This GROUP includes the following known species: *quadripustulata*, *pilatei*, *sulcata*, *cariosa*, *lineata*, *parva*, *punctata* (and var. *pallida*), *dilata*, *tenebrosa*, *carolinensis*, *marginella*, *myops*, *humeralis*, *affinis*, and *hoppingi*.

THE *CUSPIDATA* GROUP

This subdivision of the genus, represented by only the one species, *B. cuspidata* Dist., appears to be unique in so much as it shows close relationship to some species of the *arborea* GROUP by having the basal third of the scutellum raised, the female genital plates tumid and the distal portion of the fore tibiae dilated. It differs from that GROUP however by possession of the subconical humeri with a cuspidate process and, in size, being larger than the average specimens of the *arborea* GROUP.

B. cuspidata Distant (Fig. 8)

Distant, Trans. Ent. Soc. Lond., p. 689, 1900.

Brownish-ochraceous, head, pronotum and base of scutellum darkest; apical two-thirds of scutellum pale ochraceous, sparingly coarsely and darkly punctate, with an obscure small dark spot on each lateral margin about one-third from the apex which is marked with an elongate spot; corium ochraceous much marked and mottled with brownish and with small discal ochraceous spot; membrane grayish spotted and mottled with brownish; body beneath and legs ochraceous; head beneath, sternal margin, punctures and irregular lateral spots to abdomen, femora, excluding bases and spot near apex, tibiae with three annulations above and two beneath, piceous.

Head with the lateral lobes very slightly longer than central; pronotum with lateral margins armed with some very stout spines, the lateral angles acutely produced; base of the scutellum gibbous and with a central carinate elevation; margins of the abdomen strongly produced, the connexivum spotted and punctured with piceous; membrane extending considerably beyond apex of abdomen.

Long. 16 mm.; exp. pronot. ang. 8 mm.; max. abd. lat. 10 mm.

Holotype: Female.

Allotype: No males known.

Paratypes: Not specified.

Type locality: San José, Costa Rica, Alt. 1161 meters.

Type deposited: British Museum, London.

Food plants: Unknown.

Distribution: Costa Rica. Known only from the type.

THE *ARBOREA* GROUP

The species in this complex form a unified and very natural grouping. The salient characteristics that distinguish them from

others in the genus have already been given in the GROUP key. With the exception of the species *B. arborea* (Say) all species appear to be tropical or subtropical or at least southern in their geographical distribution. Whether this complex represents a more primitive or more specialized group than the next one (the *quadripustulata* GROUP) has not been established. On the basis of variations in clasper pattern there is less divergence between species here than in the series to follow. However the individual species are fairly well demarked and apparently show a limited degree of variation between individuals, except in size.

KEY TO SPECIES

- 1) Distal half to third of fore tibiae dilated, sometimes only weakly so (Fig. 11) 2
 - Distal portion of fore tibiae not dilated, sometimes with a slight thickening at the extreme tip (Figs. 12, 13) 6
- 2) Distal portion of fore tibiae strongly dilated, almost clavate; dilated laterally as well as antero-posteriorly (Fig. 11) 3
 - Distal portion of fore tibiae only weakly dilated, gradually thickened, not clavate; dilated only laterally 4
- 3) Anteocular spine or sharp denticle present; apex of head subtruncate; length, 12-14 mm., width, 8-8.5 mm. (Fig. 14).

apiculata
Van Duzee 1923 (p. 159)

 Anteocular spine or denticle absent; apex of head distinctly arcuate; length, 12-15 mm., width, 8-10 mm. (Fig. 16).

haedula
Stål 1862 (p. 161)
- 4) Buccular tooth obtuse or rounded; tooth of antenniferous tubercle blunt, small; ventral hook of clasper without a triangular lobe; valvular plates of female weakly impressed on posterior faces; length, 13 mm., width, 8 mm. (Figs. 17, 18).

aculeata
Distant 1889 (p. 164)

 Buccular tooth acute, almost acuminate; tooth of antenniferous tubercle prominent and acute; ventral hook of clasper provided with a prominent triangular flange (Fig. 20); basal valvular plates of female strongly impressed on posterior faces 5
- 5) Juga longer than tylus, their tip flaring laterally (Fig. 19);

angles of at least the first two visible abdominal segments acute and produced; length, 13.5–14 mm., width, 8 mm.

barberi

Ruckes 1939 (p. 165)

Juga and tylus subequal, not flaring; angles of abdominal segments rectangular, only moderately produced; length, 13.5–14 mm., width, 8 mm. *barberi*, var. *diluta*

Ruckes 1939 (p. 167)

- 6) Basal half of each antennal segment pale; head long and narrow (Fig. 21); juga distinctly longer than tylus; claspers lying divergent, close to lateral corners of genital cup and with a vermiform process on the tip of the ventral hook; basal valves of female plates convex, but not tumid, only slightly raised above the level of the abdominal disc; extreme tip of fore tibiae slightly swollen (Fig. 13); length, 12–17 mm., width, 7.5–9 mm. *poeyi*

Guérin 1857 (p. 168)

Only antennal incisures pale; juga and tylus usually subequal, if longer only slightly so; claspers not appressed to lateral corners of genital cup; only weakly divergent and without a vermiform process on tip of ventral hook; basal valves of female plates strongly tumid, with declivent posterior faces which bear strong impressions; tip of fore tibiae not swollen (Fig. 12) 7

- 7) Head in front of subapical teeth triangular and tip subtruncate; lateral edges of juga essentially straight; lateral margins of head not or very feebly convergent anteriorly (Fig. 22); each humerus with a shallow sulcus between its teeth and dorsal crest; length, 10–18 mm., width, 6–10.5 mm.

arborea

(Say) 1825 (p. 172)

Head in front of subapical teeth arcuate; lateral edges of juga curved; lateral margins of head convergent anteriorly (Fig. 23); dorsal crest of humerus absent or obsolescent, hence a horizontal sulcus above the humeral teeth is wanting; length, 14–18 mm., width, 8.5–10 mm. *florida*

Ruckes 1939 (p. 175)

Brochymena apiculata Van Duzee, 1923 (Figs. 14, 15)

Van Duzee, Proc. Cal. Acad. Sci., v. 12, p. 126, 1923.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 202, 1939.

Male: head slightly broader at base of antecular spine than long before the eyes, sides nearly parallel, armed before the eyes with a sharp spine as long as the apical width of the tylus; subapical tooth as prominent as in *haedula* but placed farther forward; lateral lobes scarcely passing the tylus; pronotum more even than in *haedula* or *aculeata*, latero-anterior margins armed with about five long acute teeth about as in *aculeata*, the humeral angles narrower with shorter teeth than in that species; anterior lobe with distinct smooth median line the posterior coarsely nigro-punctate but not rugose. Scutellum scarcely longer than its basal width, sides very feebly excavated, apex rounded; the base convex but not tumid; continued as a feeble median carina to apical fourth. Surface nearly smooth, nigro-punctate, the basal punctures arranged in about three vittae either side of the middle. Elytral surface even, nigro-punctate, the punctures forming an obscure transverse vitta near the middle and another near the apex each indicated on the scutellar margin. Membrane and connexivum as in *haedula*. Anterior tibiae but slightly expanded about as in *aculeata*. Antennae more slender than in either allied species, black with narrow pale base to each segment; seg. 2 a sixth shorter than seg. 3. Venter pale testaceous, impunctate, wanting black lateral vittae found in allied species. Rostrum attaining middle of third segment of venter. Genital segment similar to that of *haedula* but the protruding claspers narrower and more acute (Fig. 15).

Holotype: Male #985 Mus. Calif. Acad. Sci. No Allotype.

Paratypes: None.

Type locality: San Pedro Bay, Sonora, Mexico, July 7th, 1921.

Type deposited: Museum, Calif. Acad. Sciences, San Francisco, Calif.

Food plants: Unknown.

Distribution: Southwestern States; Northern Mexico.

Comments

Several specimens in the author's collection show variation in the nature of the antecular spine, which is of prime specific value here. This spine ranges in size from a short conical tubercle to a rather long acuminate process. In two specimens it is definitely shorter than Van Duzee states in his description while in a third it is much longer. There is also a discrepancy in the degree of dilation of the fore tibiae in my specimens. They are almost as clavate as the ones

in *haedula* and much more swollen than the ones in *aculeata*. There is no doubt that all specimens are *apiculata* for they conform in other respects to the type.

Brochymena haedula Stål (Figs. 11, 16)

Stål, Stett. Ent. Zeit., v. xxiii, p. 99, 1862.

Stål, Enum. Hemip., pt. 2, p. 17, 1872.

Distant, Biol. Cent. Amer., Hemip.-Heter., pt. 1, p. 52; pl. 5, fig. 7, 1880.

Van Duzee, Trans. Amer. Ent. Soc., v. 30, p. 28, 1904.

Barber, Jour. N. Y. Ent. Soc., v. 18, p. 28, 1910.

Van Duzee, Cat. Hemip. N. A., Univ. Calif. Studies, v. 2, p. 30, 1917.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 203, 1939.

Griseo-albida, hic illic infuscata, supra fusco-ferrugineo-punctata; callis parvis duobus discoidalibus thoracis et uno utrimque in angulis basalibus scutelli laevibus; membrana albida, fusca-varia; autennis nigris articulis basi albidus; thorace angulis lateralibus, in processum obtusum dentatum productis, marginibus lateralibus anticis parce dentatis; limbo abdominis supero saltem, nigricante, in medio margine segmenti singuli macula dilute ferruginea ornato; pedibus nigro pallidoque variegatis.

Long. 15, lat. 7 millim. (Mus. Holm. et Coll. Sign.).

Latera pectoris interdum nigricantia.

Caput lobis subaequilongis, medio interdum apice leviter deflexo, lateralibus prope apice extus dente antrorsum prominente armatis. Antennae articulo secundo tertio fere quarta parte brevior. Thorax marginibus lateralibus anticis sinuatis, dentibus nonnullis majusculis armatis, angulis lateralibus in processum truncatum, apice dentibus tribus vel quattuor armatum, productis, linea media percurrente subtili laevigata. Scutellum basi convexum, elevatum. Hemelytra corio basin versus parcius punctato. Abdomen sat ampliatus, segmentorum angulis posticus prominentibus rectis. Meso et metasternum nigra. Venter in exemplis obscurioribus parce fusco-conspersus.

Translation

Greyish-white, here and there infuscate, above fusco-ferruginous punctate; the two small calli of the thorax and one at

each basal angle of the scutellum smooth; membrane white, fusco-variegate; antennae black, base of segments white; lateral angles of the thorax produced into an obtuse dentate process, anterior lateral margins moderately dentate; abdominal margins above at least, blackish, at the middle of the margin of each segment with a dilute ferruginous spot; feet black and pale variegated.

Length 15 mm., width 7 mm. (Mus. Holm. et Coll. Sign.)

Thoracic pleura black.

Lobes of head subequal in length, sometimes middle of apex slightly deflexed, sides not far from apex armed outwardly with an anteriorly prominent tooth. Second joint of the antennae nearly one-quarter shorter than third. Lateral margins of the thorax anteriorly sinuate, armed with some large teeth, lateral angles produced into a truncate process, apex armed with 3 or 4 teeth, median percurrent line subtly laevigate. Base of scutellum convex, raised. Hemelytra sparsely punctured toward base of corium. Abdomen quite ampliate, posterior angles of segments prominent, straight. Meso- and metasternum black. Venter in darker examples sparsely fusco-conspere.

Redescription from the type specimens

Form oval; head slightly tapering from just in front of eyes; terminal half of tylus almost impunctate, paler than other markings on head; juga equal in length to tylus and rounded at tips giving an arcuate apex to head; calli tumid, deep fuscous with several irregular paler smooth spots; pronotal punctures gradually increasing in size posteriorly; posterior half of pronotal disc with a considerable number of pale smooth markings; truncated humeri upturned with three prominent and two inconspicuous bluntish teeth, these slightly retrorse; marginal teeth, before the sinus (four in male, three in female) prominent, coarse, triangular and with smaller denticles interpolated; antehumeral sinus deep and adjacent area impressed into disc; pronotum traversed by a median longitudinal narrow impunctate stripe; elevated basal third of scutellum provided with a small median saddle each side of which are a pair of dark areas with deep coalesced pits; basal elevation continued as a weak carina through apical third of scutellum; basal third of elytra with a pale smooth area, another pale smooth area near discal point; membrane distinctly milky with bright yellow-brown

markings; antennal segments three to five subequal, each slightly longer than segment two; a narrow pale annulus at the incisures of each joint in female and only on basal two joints in male; connexivum brightly alternated black and red with the lateral end of the red band becoming stramineous at the margin; the black bands unite at their inner ends to form a somewhat rectangular horse-shoe-shaped figure; under side of head rather uniformly dark fuscous; buccular edge weakly sinuate and ending in an acute tooth; the frontal edge of the jugum is broadly rounded ventrally and meets the buccular tooth at an acute angle; thoracic sternum marked longitudinally by three subequal broad bands, a median almost impunctate fuscous one, followed by a dull yellow one, laterad of which there is another dark fuscous one finely punctate; submarginal area of propleuron not conspicuously smooth; legs strikingly mottled and annulated, especially the tibiae; femora pale at basal half, dark fuscous at distal half; basal portion weakly flecked with fuscous; fore tibiae strongly dilated both laterally and dorso-ventrally producing an almost clavate appearance to the terminal third of segment; all the dilated portion dark fuscous to piceous; other tibiae not dilated but distal third and geniculum dark fuscous; abdomen dull yellow with scattered ferrugineous punctures, these congesting laterally to form well defined dark lunes on each segment; basal valves of female genital plates not strongly gibbous, rather somewhat tumid with flat tops; posterior surfaces declivent with an obscure impressed area in each plate; apical half of each plate bordered by deep fuscous; apical valves of female genitalia deep fuscous bordered internally by a narrow yellow band; median valve yellow; in the male the claspers end in an acutely rounded but not pointed tip; proctiger deep fuscous to piceous, its sides not conspicuously concave, its median keel obsolescent.

From the Sallé Collection.

Holotype: Male; 13 mm. long, 8.5 mm. wide.

Allotype: Female; 14 mm. long, 9 mm. wide.

Paratypes: None specified.

Type locality: Mexico. No definite station specified.

Types deposited: Riksmuseet, Stockholm, Sweden.

Distribution: Mexico; Guatemala. Also said to occur in the southwestern portion of the United States, but I have not seen an authentic specimen from that region.

Brochymena aculeata Distant, 1880 (Figs. 17, 18)

Distant, Biol. Cent. Amer.; Hemip.-Heter., Pt. 2, p. 327, Pl. 31, Fig. 6, 1880.

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiv, No. 2, p. 111 (fig.), 1939.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 202, 1939.

Closely allied to *B. haedula* Stål but differing by having the lateral lobes of the head distinctly longer than the central lobe; the spine above the antenniferous tubercles distinctly longer and more acute;² the spines on the lateral margins of the pronotum much longer and more prominent; in having the third joint of the antennae much longer than the second joint. The antennae are also uniformly dark and not annulated with ochraceous as in *B. haedula*.

Length: 13-14 mm.

Type: Male.

Paratypes: Not specified.

Type locality: Chilpancingo and Amula in the State of Guerrero, Mexico.

Type deposited: British Museum, London.

Food plants: Unknown.

Distribution: Mexico. (Also said to extend into the United States along the southwestern border, but I have not seen an authentic specimen from this country.)

Comments

The State of Guerrero is in the extreme southwestern part of Mexico and it is questionable whether individuals of this species reach as far north as the United States. Most specimens in American collections (California Academy of Sciences excepted) that are identified as *B. aculeata* are in all probability *B. barberi*, or *B. barberi* var. *diluta* (q.v.). The *aculeata* type specimen (male) has

² The "spine above the antenniferous tubercles" referred to by Distant in this original description probably means the subapical tooth, as there is no spine above the antenniferous tubercles in any species of this genus, unless we wish to stretch the point and call the antecular spine of *B. apiculata* Van D. such. In *aculeata* there is a blunt crenulation on the lateral edge of the antenniferous tubercle but on no place above it; in *barberi* this crenulation or denticle is acute.

claspers of the *haedula* form (Fig. 18), whereas *barberi* and *b. var. diluta* possess claspers that are distinctive (Fig. 20) in having the ventral hooks developed into triangular lobes. Furthermore there are distinct differences in the forms of the heads of the two species, *barberi* possessing juga that flare outward and upward rather than pointing forward as in the typical *aculeata*; Mr. China first called attention to this point and it is to him I am indebted for the sketches from which the figures of *aculeata* were made (Figs. 17, 18). Another difference between the two species lies in the nature of the buccular tooth, in *barberi* it being acute, almost acuminate, while in *aculeata* it is bluntly rounded.

Brochymena barberi Ruckes, 1939 (Figs. 19, 20)

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiv, No. 2, p. 111, fig. 1, 1939.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 202, 1939.

Closely allied to *B. aculeata* Dist. but differs in several very important characters. Form broadly oval, subdepressed; connexivum distinctly explanate; color dull yellowish gray to brown gray; head widest just in front of eyes then gently converging as far as the acute, large sub-apical teeth; lobes of the juga extend beyond the tylus by about a distance equal to their width there; lobes are rounded acute and tend to flare outward, not truncated and straight as in *B. aculeata*; disc quite densely nigro-punctate, the punctures tend to be elliptical rather than circular; a small tubercle, sometimes acute, just in front of each eye; surface of pronotum moderately undulant with the smooth areas about the calli rather small, long and thin, not rounded and embossed; punctures crowded, a pair of smooth, pale vermiculate markings at inner back corner of calli; antehumeral sinus quite prominent and disc there impressed; humeri quite rectangular and protrude prominently, their dorsal surfaces somewhat transversely rugose; each humerus terminates in a pair of prominent divergent teeth between which are two or three smaller teeth; a third large tooth occurs at the anterior basal border of the humerus; pronotal marginal teeth are four to five in number, are very long, narrow and very sharp; the basal third of the scutellum gibbose, its highest point well above the disc of the pronotum; a weak saddle between the lateral portions of this raised area, this bordered with a pair of smooth, crescentic yellowish bars; four obscure fuscous bands

of larger pits longitudinally across the gibbose area; median scutellar carina broad and not very high, the disc laterally of it somewhat depressed into a pair of shallow furrows; scutellar apex narrowly rounded, paler with fewer fuscous punctures in apical third; tip slightly upturned; elytra with punctures gradually congesting apically; basal fourth with evident smooth calloused pale areas; discal spot calloused and prominent; membrane hyaline with markings dark fuscous, the vermiculate ones between the veins quite large; connexivum alternated with the pale bands, triangular in outline, the apex pointing inward; posterior angles of, at least the first three visible abdominal segments, prominent and acute, projecting strongly from the edge; in *B. aculeata* these angles are not prominent, do not project and are rectangular (notes from W. E. China); edge of buccula feebly sinuate, ending in a sharp tooth; the frontal edge of the jugum is strongly sinuate; in *B. aculeata* the buccular tooth is blunt and the frontal edge of the jugum is arcuate; the middle portion of the ventral thorax is dull yellow with some scattered reddish fuscous punctures; the lateral half of the ventral thorax is darker; the intercoxal darker blotches are continuous across the segment; coxae, trochanters and basal third of femora dull yellow; distal two thirds of femora heavily spotted with deep fuscous, this forming a broad band apically, here interrupted with an incomplete annulus of pale; fore tibiae dilated apically, almost to the extent found in *B. haedula* and much greater than found in *B. aculeata*; ventral abdominal segments rather flattish, dull orange to yellow brown with scattered fuscous punctures which become deep fuscous laterally and there form some horse-shoe like markings; rostral furrow shallow; beak long, reaching at least the front edge of the third visible segment; basal valves of female genital plates very convex; the posterior face of each sharply declivent and deeply impressed; a fuscous or reddish fuscous border reaches about half way up the declivent face; intervalvular sinus deep and broad; male cup broadly oval in outline with the claspers very distinctive, the visible lobe triangular in outline, the apex pointing downward and the face slightly concave; the claspers of *B. aculeata* are not triangular in outline but narrowly elongate somewhat like those of *B. haedula*; the proctiger is orange brown its sides distinctly concave and a broad carinate ridge evident; this has an obtuse bend in it dorsally.

Size: Female: 14 mm. long; 8 mm. across humeri; 8.5 mm. across abdomen. Male: 13.5 mm. long; 8 mm. across humeri; 8.5 mm. across abdomen.

There is close relationship to *B. aculeata* shown in the size of the pronotal and humeral teeth, the long juga, the general color and the outline of the male genital cup; the main differences are the sharp buccular tooth in *B. barberi*, the obliquely flaring juga, the sharp angulation of the abdominal segments, the dilated fore tibiae, the distinctly triangular outline to the posterior face of the male paramere.

Described from eight specimens, three males and five females.

Holotype: Female: Sonoita, Santa Rita Mts., Arizona. Collected by H. Ruckes, July 21, 1937, and deposited in the American Museum of Natural History.

Allotype: Male: Sonoita, Santa Rita Mts., Arizona. Collected by H. Ruckes, July 21, 1937. Author's collection.

Paratypes: Four females and one male in the collection of the United States National Museum, all from the Huachuca Mountains in Arizona and bearing no date labels. One male specimen in the H. G. Barber collection, this dated July 28, 1905, and located in the Huachuca Mts., Arizona.

I take pleasure in naming this species after Mr. H. G. Barber, my friend and one of the leading American Hemipterists of our time.

Type deposited: American Museum of Natural History, New York.

Food plants: Unknown.

Distribution: Along the border States, southwestern U. S., also possibly in Lower California.

Comments

See remarks under *B. aculeata*.

Brochymena barberi, var. *diluta* Ruckes

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiv, No. 2, p. 113, 1939.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 203, 1939.

Very similar to *B. barberi* but with sufficient difference in important character to warrant being separated into a varietal category.

In var. *diluta* the principal characters defined for the species *barberi* are all present in a reduced form, *i.e.*, the color is lighter, the teeth shorter, the angulation of various parts more obtuse, etc.; hence the application of the term *diluta*. In var. *diluta* the lobes

of the juga do not extend beyond the end of the tylus or if so by only a very small distance; the apex of the head before the teeth is less acutely triangular; the humeral teeth are not as long as in *B. barberi* and are more blunt; the posterior angles of the abdominal segments are distinctly not acute, tending to be more rectangular and even obtusely rounded; the basal area of the scutellum is raised but not gibbose, there is still a weak saddle between the halves; the frontal edge (side view) of each jugum is less sinuate and more nearly arcuate than in *barberi*; the ventral abdominal surface is more yellowish and the punctures are lighter; there is much more pale on the lateral portion of each abdominal segment and the characteristic horse-shoe-shaped marks on each segment are less distinct and may even be obsolete.

The male and female genitalia are identical with those of the typical *barberi*; since no other relatives in the genus, as now known, have these distinctive characters there is no question of relationship between this variety and the typical species. Since all the specimens, in the collection I have examined, are from Texas, this variety may be an eastern representative of the species.

Described from six specimens from western Texas.

Holotype: Female: Size 13.5 mm. \times 8.5 mm.; Brownsville, Texas; June, 1901. Collection of Mr. H. G. Barber, Washington, D. C.

Allotype: Male: Size 12.5 mm. \times 7.5 mm.; Brownsville, Texas; May, 1903. Collection of United States National Museum.

Paratypes: Brownsville, Texas, May, 1903; Brownsville, Texas, no date (both in the H. G. Barber Coll.) Esperanza Ranch, Brownsville, Texas, July 30, 1931; Kerrville, Texas, June 19, 1908 (both in the U. S. N. M. Coll.).

I wish to add four more paratypes to this series, found in the University of Kansas collection. Two females, Hidalgo Co., Texas, August 14, 1928 (Beamer); one female, Brownsville, Texas, June (Snow); one male, Cameron Co., Texas, August 3, 1928 (Shaw).

Type deposited: H. G. Barber Collection, Roselle, New Jersey.
Food plants: Unknown.

Distribution: A more easterly replacement for the typical species *barberi*. Southern and central Texas.

Brochymena poeyi (Guérin) 1857 (Figs. 13, 21)

Guérin-Ménéville, M. F. E., in *La Sagra, Hist. de Cuba; Ins.*, p. 365, pl. 13, Fig. 1, 1857 (*Pentatoma*).

Stål, Berl. Ent. Zeit., v. x, p. 156, 1860.

Stål, Enum. Hemip., pt. 2, p. 17, 1872.

Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 28, 1904.

Van Duzee, Cat. Hemip. N. A., Univ. Calif. Publ. v. 2, p. 30, 1917.

Blatchley, Heteroptera of Eastern N. A., p. 97, 1926.

Ruckes, Bull. Bklyn. Ent. Soc., v. 34, p. 236, 1939.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 202, 1939.

Thorace lateribus grosse spinoso, humeris productis. Flava, fusco-punctata, capite nigro-lineato; thorace antice fulvo-tuberculato; antennis pedibusque nigro-annulatis.

Longueur—14 millim.

Translation

Lateral edge of thorax strongly spined, humeri produced. Yellowish, fusco-punctate, head lineated with black; front of thorax (pronotum) with brownish-yellow tuberculations; antennae as well as legs annulated with black. Length, 14 mm.

Guérin adds the following description in French.

Entièrement d'un jaune d'oere ponctué de noirâtre. Tête assez allongée, longitudinalement rayée de noir; côtés du prothorax fortement épineux, échancrés au milieu avec les angles huméraux saillants, tronqués et tridentés au bout. Il est jaune et couvert de points enfoncés noir au fond, et il offre en avant et de chaque côté, deux taches noires, dans lesquelles on remarque trois ou quatre gros tubercules lisses et peut saillants, d'une couleur presque fauve. Écusson et élytres irrégulièrement ponctués de noirâtre; la membrane des élytres blanchâtre, finement tachetée de brun. Côtés de l'abdomen ayant deux petites bandes noires transversales à chaque segment; dessous plus pâle, faiblement piqueté de brun. Antennes et pattes annelées de noir.

Translation

Entirely ochre yellow punctured with black. Head well elongated and longitudinally rayed (lineated) with black; sides of thorax strongly spined, indented at the middle with the humeral angles produced, truncated and tridentated at their ends. Prothorax yellow and covered with deep black pits, and in front and at each side are two black spots in which one can see three or four smooth and slightly raised tubercles, almost tawny in color. Scutellum and elytra irregularly punctured

with black; the membrane of the elytra whitish and delicately spotted with brown. Sides of the abdomen with two narrow transverse black bands across each segment; below paler, weakly punctured with brown. Antennae as well as legs (feet) annulated with black.

Redescribed

Form oval with connexivum distinctly explanate; color dull ochre brown, being a mixture of dull yellow ground and numerous uniform fuscous punctures, each with a whitish bloom; head proportionately longer and narrower than any other species in this group, widest just before the eyes and converging slightly toward apex; subapical teeth prominent, smaller than in *arborea* but still meeting the juga in a deep sinus; juga long and extending well beyond tylus leaving a distinct rectilinear sinus there; inner edges of juga parallel; several irregular, elongated smooth yellowish bars on top of head; calli fuscous and slightly raised with four to six raised smooth yellow blotches; posterior half of pronotal disc with punctures of uniform size, these sparsest in the middle quarter; humeral teeth strong and bordered with fuscous; several smaller teeth between large humeral teeth; marginal teeth pale yellow, long, acute, flat-triangular and distinctly paler than their reddish bases; anterior third of scutellum raised but not tumid, rather smoothly convex; two pairs of obscure fuscous bands each side of the middle of this raised area; median carina obsolescent; apical portion truncated at tip and with a weak median notch there; elytra with punctures congesting and coalescing apically, smooth areas most evident at the base; membrane clear to slightly milky with rich brown markings; connexivum strikingly alternated with each pale band at least as wide and usually half again as wide as the black bands across each incisure; mid-point of each incisure raised in a pale point; under surface of head irregularly streaked with pale and fuscous; edge of buccula distinctly sinuate and ending in a prominent acute tooth; frontal edge of jugum vaguely sinuate and meeting the buccular tooth at an obtuse angle; antennae very distinct for this genus, basal segment reddish fuscous, remaining ones annulated with broad pale bands at the base (these at least a third the length of each segment) and black at the apex; segments two and three subequal but each shorter than four and five; thoracic venter and pleura mostly pale yellowish, some obscure fuscous markings laterally, these

most evident on the propleuron beneath the marginal teeth and below the humerus; coxae and basal half of femora pale yellow, distal half of femora with a pair of broad fuscous annuli between which is a pale ring; tips of femora pale; tibiae strikingly annulated yellow and dark fuscous, each middle small dark blotch only on front face and distinctly rectilinear; tarsi pale yellow with distal half of last segment fuscous; abdomen dull yellow with scattered rufous punctures; each segment with an obscure darker lune near each lateral margin; abdomen fairly convex so that rostral furrow is proportionately deeper than in allied species; posterior angles of abdominal segments protruding and rectilinear; basal valves of female genital plates not tumid as in allied species of this GROUP but rather convex without declivent and impressed posterior faces; these plates bordered narrowly with fuscous; male genital segment with lateral tips protruding and forming a lobe on each side, along the inner surface of which lie the divergent heads of the claspers; the lower hook of each clasper terminates in a vermiform process.

Redescribed from specimens in the United States National Museum from Mangrove Cay, Andros Island, Cabo Blanco, Cuba.

From specimens in the Cuban Museum, Santiago, Cuba.

From specimens in the author's collection.

Type: Sex not stated.

Paratypes: Not specified.

Type locality: Cuba.

Type deposited: W. Horn (1935) in his work "Ueber Entomologische Sammlungen" states that the Guérin-Méneville hemipteran types were deposited in the Zoological University Museum in Naples. Assumedly the *B. poeyi* type is there, but I have no confirmation of that fact.

Food plants: Unknown.

Distribution: Cuba, possibly also other West Indian Islands. It is said that this species extends to the southern tip of Florida, but it is suspected that all such specimens identified as *B. poeyi* are in reality a form of *B. arborea*.

Comments

A very easily recognized species of the *arborea* GROUP by virtue of its contrasting markings, its annulated antennae and the structure of the female and male genitalia. A study of its distribution

throughout the West Indies should result in some very interesting knowledge concerning insular variations as applied to Pentatomidae.

Brochymena arborea (Say) 1825 (Figs. 2, 22)

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Froeschner, Amer. Midland Nat., v. xxvi, pt. i, p. 135, pl. 2, fig. 22, 1941.

†*erosa* (Herrich-Schaeffer), Wanz. Ins., v. v, p. 70, fig. 515, 1839; v. vii, p. 56, 1844. (*Halys*.)

†*annulata* Walker, Cat. Heter., v. i, p. 230, 1867.

Brownish-cinereous, punctured; clypeus emarginate and bidentate; thorax dentate and with a prominent truncated spine behind each side; feet annulate.

Inhabits Missouri.

Body brownish-cinereous with numerous black punctures; head with a longitudinal obsolete elevated line and an abbreviated one each side its middle; clypeus emarginate at tip; lateral edge terminating in an angle near tip; antennae, base of second joint pale; thorax unequal before, dentated each side; teeth irregular unequal, acute; posterior angles extended into a prominent dilated slightly reflected, truncated projection which has two or three small teeth; hemelytra with central nervure conspicuous; nervures of the membranaceous tip black and with black arborescent lines in the interstitial spaces. Wings dusky iridescent, nervures black; feet black; thighs pale at base and annulated with pale near tips; tibiae annulated with pale; tarsi second joint pale; tergum deep purple, black impunctured; margin brownish cinereous, punctured, varied with transverse abbreviated black lines placed triangularly, and pale; venter pale, pruinous, with dusky points; stigmata each composed of three distinct black points placed obliquely; pectus and postpectus pale, dusky each side.

Length: Less than $3/5$ inch.

Redescribed

Form broadly oval with connexivum explanate and slightly declivent laterally; ground color dull yellow, brownish, or reddish yellow with fuscous to piceous punctures the majority of which are uniform in size and even in distribution; surface of the head somewhat undulant with the lobes of the juga and front half of the tylus sometimes declivent; a small sharp tubercle sometimes on margin in front of each eye; subapical teeth large, pointing outward and upward so that subapical sinus is deep and acute; juga tend to reach beyond the tip of the tylus, but are not contiguous there, leaving a preapical sinus; their tips are blunt and the tip of the head in front of the subapical teeth is sub-truncate; pronotum with antehumeral sinus deep as is an adjacent impressed area; calli swollen, almost tumid, dark with numerous pale, irregular smooth blotches; a distinct squarish median impressed area in pronotal disc between calli; pronotal margins with three to six large, flattish, acute, triangular teeth with some smaller ones interpolated; humerus with a prominent raised crest obliquely across its apex subtended by a well formed parallel sulcus; humeral teeth three to four in number, blunt and retrorse; the raised basal third of scutellum continued as a median broad

ridge posteriorly to apical third; the tip of the scutellum broadly rounded its preapical area usually somewhat impressed; puncturation of scutellum rather even though some punctures tend to congregate on the raised portions; elytra with punctures becoming congested apically, a fine reticulum of smooth yellow lines is present; a larger smooth area near the base of each elytron; membrane clear hyaline with rich brown and fuscous markings; connexivum strikingly alternated with black bands extending to edge of each segment; underside of the head fuscous with some indistinct longitudinal paler vittae; buccular edge distinctly sinuate and ending in acute tooth; anterior (frontal) edge of each jugum truncated; antennal segments dark fuscous only the incisures between segment with a pale ring; segment two somewhat shorter than segment three; the basal segment usually not extending beyond the tip of the subapical tooth; fuscous punctures tend to congregate and congest on pro-, meso-, and metapleura; sternum pale with a pair of large dark spots on the mesosternum, between the pro- and mesocoxae; a distinct fuscous crescentic smooth area just below the pronotal marginal teeth; bases of coxae, trochanters, and femora pale; femora with a few basal fuscous spots which tend to aggregate distally into dark blotches; tibiae clearly annulated with a small square spot filling the space between the sulcate edges in the middle of each annulus; tarsi fuscous with the middle segment paler; abdomen dull yellow or light brown with scattered small punctures; obsolescent dark lunate markings at lateral extremities of each segment; basal valves of female genital plates distinctly tumid with the highest point in the middle of each plate; posterior face of each plate declivent but not appreciably impressed or concave; only the median apical corners of basal plates fuscous; ventral hook of clasper narrow and terminating acutely but not in an acuminate tip.

Type: Sex not stated.

Paratypes: Not mentioned.

Type locality: Missouri (?).

Type deposited: Probably in the Academy of Natural Sciences, Philadelphia. Now unknown and probably lost.

Food plants: Oak, beech, willow, apple, peach, pear, grape, pine. Also said to be predatory on soft-bodied larvae.

Distribution: Widespread over the eastern states to Canada, southward to Florida, westward to Texas, New Mexico, and Mexico.

Reaches the Plains States to eastern Kansas. No new localities to be added to the Van Duzee list.

Comment

In the eastern states this is one of the two common species, the other being *B. quadripustulata* (q.v.). It apparently is very variable and may be the ancestral form from which several other closely related species in the GROUP arose. It probably has geographic races, though these have, as yet, not been studied and defined. Specimens from the southwest differ greatly at times from those of the northeast, the teeth being more acute and proportionately a bit larger; those of the Gulf States are more brightly colored and usually of a lighter hue. In size the individuals of this species also vary greatly; some measure no more than 9 mm. long while others are at least half again that size.

The individuals are never abundant enough in any one locality to be called common, yet they appear throughout the summer months with consistent regularity.

Brochymena florida Ruckes 1939 (Fig. 23)

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiv, No. 5, p. 236, 2 figs., 1939.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 203, 1939.

Form oval, subdepressed, roughish, faceted; color yellowish or reddish brown rather than grayish brown as in *arborea*; distance across head just in front of eyes one third greater than transverse distance between subapical teeth, so that sides of head tend to converge anteriorly (in *arborea* this distance averages only about one sixth greater and the sides of the head are more nearly parallel) juga subequal to tylus, very seldom longer and then by only a very small fraction of their width at their tips; the outline of the head in front of subapical teeth arcuate or nearly so, the edges of the juga being slightly curved (in *arborea* the juga are usually distinctly longer than tylus and an appreciable rectilinear sinus between their tips is usually evident, the edges of the juga are more nearly straight and the outline of the head in front of the subapical teeth is more nearly truncate); dorsal surface of the head less undulant than in *arborea*; first antennal segment reaches well beyond the tip of the subapical tooth and frequently as far forward as the tip of head (in *arborea* this segment is shorter, only occasionally

does it reach more than midway beyond the tooth); pronotal surface not as strongly undulant as in *arborea* with the anterior median rectilinear depressed area more shallow than in that species; humeri, as in allied forms, quadrangular, with a prominent tooth at the front and hind corner and at least one smaller one between; *the dorsal lateral edge of the humerus is not raised in an oblique smooth bar or obtuse ledge as in arborea and there is no horizontal sulcus between the humeral teeth and its dorsal surface* (this sulcus is usually very pronounced in *arborea*), *the dorsal humeral surface is gradually continuous to the lateral edge and the whole humerus is not block-shaped and thickish as in arborea*; basal third of scutellum while swollen is certainly not tumid and its highest point is not much raised above the disc of the pronotum (in *arborea* usually this portion of the scutellum is quite high and its surface very undulant); femora with fuscous markings usually restricted to the distal half of the shaft (in *arborea* they extend onto the proximal half and in many instances as far proximad as the trochanter); tibiae distinctly sulcate with the edges raised and quite evident (in *arborea* the edges are usually indistinct and the sulcus shallow); the annulations on the tibiae are distinctive in that there are usually only two broad black annuli, one toward each end of the shaft, and a much smaller central one, indistinct and frequently represented by only a few darkish flecks (in *arborea* the annuli, three in number are more nearly subequal in size, especially on the fore tibiae, and the middle annulus is rectilinear and conspicuous); the first tarsal joint has the major portion of its dorsal surface pale and frequently the second joint is pale also; exposed portion of the connexivum alternated as in *arborea* but the dark bars do not reach the very edge of the segments, or if they do they are weak there and inconspicuous; the ventral stigmata in oblique lines, mentioned by Say for *arborea* are much less conspicuous than in that species, the colors being paler and the dark ring around each spiracle much narrower; anterior and posterior angles of ventral abdominal segments either lack the black triangular spot, so characteristic for *arborea* or the marks are very obsolescent, the females have a greater tendency to retain these spots than the males, in which case then the dark bands on the connexivum reach the edge of the segments; the horseshoe-shaped fuscous or black vittae on the lateral ends of each ventral segment, also so characteristic of *arborea*, are lacking or very indistinct; genitalia, both male

and female somewhat heavier than in *arborea*; the exposed posterior surface of the hook of the male paramere is flattish and in some specimens shallowly sulcate, the lateral surface of the paramere appears dark fuscous and the medial surface much paler, tawny or light fuscous (in *arborea* the hook of the paramere has its surface slightly convex and the surfaces are more nearly concolorous); female with a small triangular sinus between the proximal median corners of the basal valves and the midpoint of the posterior edge of the previous segment.

Holotype: Female, 18 mm. long, 10 mm. across humeri, Tampa, Fla., A. M. N. H. Acc. No. 26226; Coll. Mrs. A. T. Slosson. Deposited in the American Museum of Natural History.

Allotype: Male 14 mm. long, 8.5 mm. across humeri. Same data as holotype. Deposited in the author's collection.

Paratypes: Purdue University Collection: Males: Dunedin, Fla., 1/13/30, 11/13/11, 2/29/13; Mooseft, Fla., 3/2/18; Royal Palm Pk., Fla., 12/12/24; Cape Sable, Fla., 2/23/19. Females: Dunedin, Fla., 1/20/18, 4/13/25; Little River, Fla., 8/1/31 (J. C. Bradley); Royal Palm Pk., Fla., 12/12/34, a second specimen, no date, Coll. P. M. Jones; Cape Sable, Fla., 2/23/19 (2 specimens). American Museum Collection, in addition to the types; Males: Biscayne Bay, Fla., 8/20/35 (2 specimens); another specimen from the A. T. Slosson Collection, no date; A. M. N. H. Acc. No. 26226. Female: La Belle, Fla., 4/27/12.

Habitat: Definitely known from Florida, may be expected to occur in southern Georgia and Alabama westward to Texas. It appears to be a southern replacement for *B. arborea* (Say).

Type deposited: American Museum of Natural History, New York.

Food plants: Not definitely known but probably may be found on the same as for *arborea*.

Comments

A relatively recently described species which undoubtedly is the one most closely related to *B. arborea*. At first it was thought to be merely a minor variety of *arborea*, but a close study of its salient characters led to its creation as a distinct species.

THE QUADRIPUSTULATA GROUP

Into this category I have placed certain combinations of associated species all of which differ from those preceding by, at least,

the characters designated in the keys (p. 156). Within this GROUP the species may be further subdivided into lesser complexes if one wishes to use genitalic characters for such differentiation. Whereas the characteristics found in the female genital plates, while not obscure, are somewhat subtle, those of the male cup and claspers are rather outstanding and distinctive. The four types of claspers found among these species have previously been mentioned (p. 147). To these should now be added the four types of genital cup associated with each type of clasper.

In the *cariosa* grouping (p. 147) the cup is small and shallow, its ventral wall variously reflexed or upturned apically, obscuring the contents in part; the lateral tips are either bluntly or acutely rounded but do not project beyond the apical corners of the seventh abdominal segment and the cup is deeply retractable; the cavity of the cup is somewhat limited in its capacity and the contents appear as if crowded by virtue of the fact that the entire periphery of the cup is inflexed; the dorsal border is continuous, except for an inconspicuous median area (where a narrow, depressed superior ridge occurs) and no sharp prominent teeth project posteriorly from it.

In the *punctata* grouping the open face of the cup is rhomboidal in *punctata* and broadly oval to almost orbicular in *dilata*. The claspers and proctiger are very large in both species and occupy most of the available space. The dorsal border is provided with a narrow over-hanging flange and the superior ridge is narrow laterally but bluntly tongue-shaped longitudinally. The inner faces of the genital cup are strongly hirsute. The ventral border is only weakly upturned and not inflexed. The proctiger is sub-rectangular in outline, without a keel, in fact its face is distinctly impressed below the dorsal bend. The entire cup is small and retractible so that the apical corners of the seventh segment protrude well beyond it. No teeth project posteriorly from the dorsal border across the open face of the cup.

In the *carolinensis* grouping (p. 147) the cup is robust and deep, its ventral wall gradually but very broadly upturned apically leaving the cup somewhat flat-faced across its exposed ventral surface or somewhat impressed there; the lateral tips are acutely rounded and, even when the cup is totally retracted, reach at least to the apical corners of the seventh segment, and usually protrude beyond; the cavity of the cup is capacious and its contents not crowded, indeed there appears to be more space than structural contents; the dorsal border is broken medianly by a prominent, broad or narrow depressed superior ridge that extends as a shelf

underneath the lateral portions of the border above it; from the dorsal border on each side, about midway between the median point and the lateral tip, a prominent stout tooth projects posteriorly above the widely open cup.

In the *affinis* grouping the cup is robust and nearly as deep as that found in the preceding, with the ventral wall similarly broadly upturned, but its apical edge is provided with a rather deep transverse sulcus each side of the middle; the most striking feature of the cup in this grouping lies in the great extension of the lateral tips, which project very far beyond the apical corners of the seventh segment, so much so that the cup cannot be retracted as in most other species; the entire periphery of the cup is somewhat roundly inflexed, so that the spaciousness of the cup is reduced, otherwise the cavity is deep and the contents not crowded; as in the *carolinensis* grouping the dorsal border is broken and is provided with similar stout teeth.

In constructing the following keys an attempt has been made to keep closely allied species in opposable couplets and the couplets in progressive succession leading from assumedly the more primitive species to the more specialized ones. Thus the keys become less artificial, but at the same time more difficult to compose and use. I am told that some of the characteristics employed are somewhat subtle and evasive; this is probably due to the fact that the one using the keys is not too familiar with the array of species in this genus. With a goodly number of the species before him a student should not have too much difficulty with his identifications. Even such astute students of the Hemiptera as Van Duzee, Blatchley, Hart, etc., admitted repeatedly that they ran into trouble attempting to construct keys of a natural as contrasted with an artificial type. There is no question but that the genus *Brochymena* is one of the most difficult ones among the Pentatomidae to analyze.

KEY TO THE QUADRIPUSTULATA GROUP

- 1) Apical lobes of juga considerably longer than tylus, subfoliate,
 - (a) overlapping, leaving no preapical sinus there (Fig. 25), or (b) with their inner margins parallel or connivent, leaving an elongated preapical sinus between them (Fig. 27); antennal segment two never longer than segment three; species narrowly oval or elliptical in outline only. 2
- Apical lobes of juga subequal to tylus or if longer, not subfoliate, overlapping or connivent but stubby and not longer than tylus than by a part of their width at the apex (Fig.

30, 38); their inner margins usually parallel leaving a short and broad preapical sinus between them; antennal segment two either longer or shorter than or equal to segment three; species may be any form in outline 4

- 2) Color dull yellow to pale orange; membrane usually milky with arborescent and vermiculate markings pale, weak and obsolescent; venter dull yellow sparsely punctate; laterally with obsolescent lunate markings on each segment; base of second, third and fourth antennal segments with a pale annulus. Length 12-14 mm.; width 5.5-6.5 mm. *pilatei*
Van Duzee 1934

Color not as above; darker; grayish brown to fuscous; membrane either vitreous or milky but with arborescent and vermiculate markings strong and conspicuous; venter not dull yellow; punctured finely laterally and with dark, whole or broken lunate marks near lateral edges of each abdominal segment; antennal segments not annulated at the bases or only base of segment three so; only segmental incisures pale. 3

- 3) Inner edges of juga connivent to overlapping; humeral angle rectilinear to obtuse, hardly produced into an acute tooth; membrane vitreous with dusky suffusion; median spot in pale annulus of fore tibia rectilinear, prominent and occupying about half the length of the pale annulus; osteolar auricle blunt-lanceolate (Fig. 24-B), not much longer than diameter of its orifice; male genital segment without a transverse sulcus across its apical edge. Length 10-18 mm.; width 6-9.5 mm. *quadripustulata*
(Fabricius) 1775

Inner edges of juga usually parallel so that lobes do not converge or overlap but leave an elongated preapical sinus between them; humeral angle acute and somewhat produced into a tooth (Fig. 28); membrane milky hyaline with but little if any dusky suffusion; median spot in pale annulus of fore tibia small to obsolescent, leaving most of the pale annulus unfilled; sometimes this dark spot is lacking; osteolar auricle distinctly longer than its adjacent orifice and usually acute-spatulate in outline (Fig. 24-C); male genital segment with a distinct transverse sulcus across its apical edge; general color of species grayish rather than fuscous. Length 12.5-15 mm.; width 6-8 mm. *sulcata*

Van Duzee 1918

- 4) Antennal segment two longer than segment three; second rostral joint reaching the mesocoxal cavities or nearly so; third rostral joint reaching the metacoxal cavities; tip of beak extending beyond the border of the fourth (third visible) abdominal segment. 5

Antennal segment two shorter than or subequal to segment three; second rostral joint reaching no farther than about midway between the pro- and mesocoxal cavities; third rostral joint not attaining the metacoxal cavities and the tip of the beak not extending beyond the fore border of the fourth (third visible) abdominal segment 6

- 5) Form broadly oval, dorsum convex; design mottled, no prominent pale raised calloused lines extending longitudinally across the pronotum onto base of scutellum; dark alternations of connexivum reaching the margins of the respective segments. Length 17-19 mm.; width 8.5-10 mm.

cariosa

Stål 1872

Form narrowly oval to elliptical (Fig. 1); subdepressed; design lineated, a pair of prominent pale, raised, calloused lines extending across posterior edge of pronotum onto base of scutellum; dark alternations of connexivum hardly reaching the margins of the respective segments, leaving the abdomen bordered by a narrow impunctate pale line; length 16.5-17 mm.; width 8 mm. *lineata*

Ruckes 1938

- 6) Propleuron and pronotal surface directly above it swollen so that lateral half of prothorax appears subglobular and the lateral margin becomes inconspicuous; marginal teeth few (usually three), small, sharp, and wide-spaced (Fig. 32); species rather small, usually less than 14 mm. in length; upper and lower margins of male genital cup flexed. Length 10-14 mm.; width 5-7.5 mm. *parva*

Ruckes 1946

(*obscura* (H.-S.) 1839)

Propleuron and pronotal surface not swollen as above; pronotal margin thick, usually prominent and frequently acute; marginal teeth more than three in number and close together, sometimes blunt; species medium to large in size (12-22 mm. in length), not strongly convex, in some cases decidedly depressed. 7

7) Apex of head in front of subapical teeth roundly truncate or broadly arcuate; subapical sinus obsolescent; head wider through the eyes than long from base to apex (Fig. 29); elytra with numerous small pale points; exposed surface of the claspers distinctly squarish (Fig. 5); apical edges of basal valves of female genital plates deeply sinuate 8

Apex of head in front of subapical teeth narrowly arcuate, triangular or otherwise but not roundly truncate; subapical sinus evident, acute or obtuse but not obsolescent; elytra with various markings but when pale points are present they are few and scattered; head narrower through the eyes than long from base to apex; exposed surface of clasper any shape but never squarish; apical edges of basal valves of female genital plates not sinuate or only vaguely so. 9

8) Forms brown or reddish, legs particularly so; length 15-17 mm.; width 8-9 mm. *punctata*

Van Duzee 1909

Forms gray or ashy pale; length 14-16 mm.; width 7.5-8.5 mm. *punctata*

var. *pallida* Blatchley 1926

9) Antehumeral sinus obsolescent and adjacent impression inconspicuous (Fig. 33), shallow, when evident circular in outline; tibiae without annulations or with very vague ones; punctures of body fine and numerous but forming no particular design; very few small pale points evident; form broadly oval, abdomen almost orbicular, its greatest diameter wider than distance across humeri; ventral surface of male genital cup with a pair of prominent protruding auricular lobes; exposed inner face of claspers semi-circular in outline. Length 17-18.5 mm.; width 9-9.5 mm.

dilata

Ruckes 1938

Antehumeral sinus evident and adjacent depressed area clearly marked (Figs. 34-36); tibiae distinctly annulated; body punctures forming some sort of design and smooth pale points numerous (except in *carolinensis*); form less broadly oval, diameter of abdomen equal to or less than distance across humeri; male genital cup varied in form but not with a pair of protruding ventral auricular lobes; exposed inner face of clasper any form but not semi-circular. 10

- 10) Lateral pronotal margins bright yellow, thickish, calloused, with but very few punctures if any; teeth concolorous with adjacent margin; humeri edentate; four conspicuous yellowish calloused spots present, two on disc of pronotum and one at each basal angle of scutellum; tibia conspicuously annulated, the pale annulus without a trace of a dark spot; length 18-22 mm.; width 9.5-12 mm.*myops*
Stål 1872

Characters other than above 11

- 11) Exposed portion of connexivum raised above the disc of the abdomen so that elytra appear to be impressed or sunken into dorsum (Fig. 37). 12

Exposed portion of connexivum not raised above the disc of abdomen, sometimes weakly declivent, and the elytra do not appear to be sunken below the exposed edge of the abdomen. 13

- 12) Apex of head in front of subapical teeth subtriangular (Fig. 30); narrow edge of connexivum alternated across the marginal sulcus; discal point on elytra pale and evident; humeri well raised above the surrounding pronotum; a strong oblique crest across each humerus; antehumeral sinus well defined; length 11-18 mm.; width 8-11 mm.

carolinensis

(Westwood) 1837

Apex of head in front of subapical teeth subtruncate (Fig. 31); subapical teeth blunt, but their sinuses still evident; alternations of the connexivum stop at the marginal sulcus leaving the entire abdominal edge bordered by a narrow, continuous pale line; discal point of elytra inconspicuous to obsolete; humeri not much raised above the surrounding pronotum, oblique crest across each humerus weak, not evident; length 18.5-20 mm.; width 10-11 mm. *marginella*

Stål 1872

- 13) Species distinctly convex, larger (usually more than 16 mm.); lateral margins of pronotum weakly arcuate before the antehumeral sinus; lateral borders of only the first two ventral segments transversely rugose or not rugose at all 14

Species distinctly subdepressed, smaller (usually not over 16 mm.); lateral margins of pronotum strongly arcuate before the antehumeral sinus (Fig. 36); lateral borders of all ventral segments transversely rugose 15

- 14) Ventral edges of first two abdominal segments weakly, but distinctly, transversely rugulose, appearing as if milled; juga

longer than tylus; head broadly triangular in front of subapical teeth, and broadly truncate at apex (Fig. 38); length 16.75-17.5 mm.; width 8.5-9.5 mm. *tenebrosa*
Walker 1867

Ventral edges of abdominal segments smooth or slightly roughened but not transversely rugulose or milled; juga and tylus subequal; apex of head in front of subapical teeth long, triangular and narrowly truncate at apex (Fig. 39).
humeralis

Ruckes 1939

- 15) Subapical teeth acute, their sinuses evident and usually rectilinear to acute (Fig. 40); tips of subapical teeth pale in contrast with disc of head; antennal segment three about equal to segment two, segments one and two rufous; pronotal marginal teeth tending to be yellow or ivory; length 12-16 mm.; width 7-8 mm. *affinis*

Van Duzee 1904

Subapical teeth obtuse, almost appearing as crenulate lobes, their sinuses obtuse and inconspicuous (Fig. 41), sometimes obsolescent; tips of juga and tylus concolorous with disc of head; antennal segment three almost half again as long as segment two; basal segment dark fuscous, segments two to five piceous; pronotal marginal teeth tend to be reddish; length 10-14 mm.; width 6-7.5 mm. *hoppingi*

Van Duzee 1921

Brochymena pilatei Van Duzee, 1934

Van Duzee, Pan Pacific Entomologist, v. x, p. 22, 1934.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 204, 1939.

Head distinctly arcuate before the eyes, about rectilinear in *sulcata*; cheeks exceeding the tylus, sometimes somewhat connivent but rarely touching before the apex. Pronotum as about in *sulcata*, sides sinuate, dentate for their whole length, the teeth being smaller on the humeral lobe. Scutellum less elevated and narrower behind the frenum; membrane reticulate with fulvous brown instead of black, these reticulations nearly obsolete at times; antennae and feet as in *sulcata*; puncturation of upper surface irregularly distributed but more uniform in size than in *sulcata*, a few about the base of the scutellum being larger and black, the scattering large punctures found on the pronotum of *sulcata* being wanting in *pilatei*. Last ventral seg-

ment of male sulcate as in *sulcata*, the fringe of long hairs heavier and nearly meeting over the smooth depressed area; claspers somewhat shoe-shaped, broader and more triangular than in *sulcata* with a distinct heel, narrower with rounded angle in *sulcata*.

Color paler, with fulvous brown effect, produced by the castaneous puncture on a yellow background, with a few pale calloused spots, especially on the elytra; antennae black with pale incisures; beneath yellowish ferruginous, the pectoral pieces with groups of black punctures laterally; sides of cheeks below, a broken annulus on apex of femora and apical annulus, and about three spots on the tibiae and the apex of the tarsi black; vestiture beneath pale of short hairs on venter but mixed with long ones on the legs.

Holotype: Male #3839, deposited in Mus. Calif. Acad. Sci.

Allotype: Female #3840, deposited in Mus. Calif. Acad. Sci.

Type locality: El Centro, Imperial Co., Calif.; Jan. 26, 1910.

Paratypes: A long series with the same data.

Food plants: Unknown.

Distribution: Lower California, northwestern Mexico, southern California, western Arizona, Utah.

Comments

Due to the striking yellowish color, *pilatei* is one of the most readily identified species in the genus. The elytral membrane tends to be milky rather than hyaline. The sulcus across the apical border of the male genital cup is not as deep and wide as in *sulcata* but the vestiture is about the same or perhaps a bit heavier. From both the description and the facies of individuals it is very obvious that this species is most closely related to *sulcata*. While the ranges of the two overlap somewhat, *pilatei* has a tendency to be more abundant in the southern and western areas.

Brochymena quadripustulata (Fabr.), 1775 (Figs. 1-B, 10, 24-B, 25, 26)

Fabricius, Syst. Ent., p. 704, 1775. (*Cimex*.)

Goeze, Ent. Beytr., v. i, p. 238, 1778. (*Cimex*.)

Fabricius, Spec. Ins., v. ii, p. 347, 1781. (*Cimex*.)

Fabricius, Mantissa Ins., v. ii, p. 285, 1787. (*Cimex*.)

Gmelin, in Linnaeus, Syst. Nat., Edn. 13, v. i, pt. 4, p. 2140, 1788. (*Cimex*.)

Fabricius, Ent. Syst., v. iv, p. 100, 1794. (*Cimex*.)

- Fabricius, Syst. Rhyng., p. 182, 1803. (*Halys.*)
 Dallas, List of Hemip., v. i, p. 188, 1851. (*Brochymena.*)
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 Van Duzee, Bull. Buf. Soc. Nat. Sci., v. v, p. 170, 1894.
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 1900.
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 1917.
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 1923.
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 Leonard, A List of the Insects of New York, p. 78, 1926.
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 Brimley, The Insects of North Carolina, p. 61, 1938.
 Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 204,
 1939.
 Froeschner, Amer. Midland Nat., v. xxvi, p. 135, 1941.
 †*serrata* (Palisot de Beauvois), Ins. Rec. Afr. Am., p. 187,
 pl. Hémip. 11, fig. 8, 1805. (*Halys.*)
 Amyot and Serville, Hémip., p. 107, 1843. (*Brochy-*
mena.)
 Uhler, Hayden's Surv. Terr., Rept. for 1871, p. 394,
 1872.
pupillata (Herrich-Schaeffer), Wanz. Ins., v. iv, p. 104,
 fig. 453, 1839. (*Halys.*)
 (Herrich-Schaeffer), Wanz. Ins., v. vii, p. 58, 1844.
 (*Halys.*)
 †*annulata* Uhler, Bull. U. S. Geol. Geog. Surv., v. i, p. 283,
 1876.
 Uhler, Proc. Bost. Soc. Nat. Hist., v. xix, p. 373, 1878.
 Provancher, Pet. Faune Ent. Can., v. iii, p. 35, 1885.

Thorace crenato, obtuse spinose scutelloque punctis duobis rufis.
 Habitat: America. (Drury.)

Præcedente (*C. annulata*) paulo minor. Clypeus fissis. Thorax
 lateribus crenatis, postice obtuse spinosis, scaber, fuscus, punctis
 duobus parvis ferrugineis, dosalibus. Scutellum concolor, punctis

duobus paulo majoribus ferrugineis ad basin. Elytra et alae fusca. Subtus cinereus.

Translation

Thorax crenate, obtuse spinose, scutellum as well as thorax with a pair of reddish points.

Habitat: America (Drury Collection).

Slightly smaller than the preceding (*C. annulata*). Apex of head cleft. Thorax laterally crenate, posteriorly obtusely spinose, rough, with a pair of small ferrugineous points on the dorsal surface. Scutellum concolorous with a pair of larger ferrugineous points at the base. Elytra and wings fuscous. Below ashy.

Redescription

Form narrowly oval to elliptical, dark brown to fuscous, subdepressed. Head before the eyes not much wider than across the tips of the subapical teeth, sides concave; subapical teeth rectilinear and strong and their sinuses rounded obtuse; jugs subfoliate and much longer than tylus, connivent or overlapping; if connivent, the preapical sinus is deep and narrow and its sides are not parallel; disc of head undulant and irregularly wrinkled; surface of pronotum undulant with areas about calli well raised and a vague rectangular portion between them impressed; area in front of humeri, adjacent to antehumeral sinus likewise impressed; a smooth ferrugineous point at the inner corner of each callus; margins of the pronotum before the humeri weakly arcuate and provided with from 5-10 moderately strong triangular teeth between which are numerous denticles; humeri terminating obtusely with retrorse serrations on frontal edge and a weak crest obliquely across the top; the area of the pronotum just behind each humerus and above the base of the elytra is distinctly tumid, more so than in allied species; scutellum with base slightly raised, tending to be flat-topped; punctures largest on basal third, forming vague divergent bands there; basal angle of scutellum smooth and raised, usually ferrugineous and pitted with a cluster of deep piceous punctures, another elongated cluster just behind the angle along the edge; scutellum is not carinate, but there is a weak, convex median ridge which is evanescent toward the apical third of the disc; elytra with rather uniform punctures which are densest toward the apical end and scattered toward the costal base; discal point weak and inconspicuous; membrane

hyaline with strong, rich brown markings, mostly concolorous, a few nearer the apex being darker; submarginal band moderately wide, wider than its distance from the edge of the membrane; under side of head rather evenly punctured without distinct lineations; darkest beneath the juga and subapical teeth; buccular edge sinuate for its entire length terminating in an acutely rounded but not pointed tooth; frontal edge of jugum oblique, straight or very weakly convex, meeting buccular tooth at about a right angle; antennae piceous, segment one sometimes with a reddish tinge; segment three about half again as long as segment two; sternal area with the usual dark rounded patches between the pro- and mesocoxae, remainder testaceous becoming darker laterally so that pleural area is fuscous; a strong piceous arcuate sulcus on propleuron below the marginal teeth; metasternal orifice oblique, its auricle black, sub-lanceolate and about as long as the crateriform base with only a vague partial spiral twist to it; pebbled evaporating area contrastingly pale; femora dull brown or yellow, sparingly speckled with black proximally, spots congesting distally to form solid patches; a subapical pale incomplete annulus present; tibiae with their pale annulations narrower than adjacent black ones; fore tibia with a median square spot reaching across frontal width of segment; tarsi piceous; ventral abdominal furrow obsolescent, most distinct on the first and second visible segment just behind the metacoxae; beak not reaching the hind border of the second visible segment; venter dull yellow or light brown, rather evenly punctured; dark lunes laterally on each segment; basal valves of female genital plates weakly convex, hardly raised and not declivent behind; a subtriangular fuscous patch between them; male genital cup narrow, its ventral surface up-turned or deflexed, moderately impressed medianly and its apical edge forming a very broad and shallow "V"; the ventral edge is involuted so that the heads of the claspers are almost totally invisible from behind; no prominent sulcus present across the apical end of the cup; the vestiture is dense but very short. Average size, 14 mm. long; 9 mm. across abdomen.

Type: Sex not stated.

Type locality: "America."

Type deposited: Now lost.

Food plants: Pines (various species), sumac (*Rhus typhina* Linn.), mountain ash (*Sorbus americana* Marsh), elm, grape, cherry,

apple, pear; also being recorded as occasionally being predatory on soft-bodied larvae.

Distribution: Across southern Canada and United States from the Atlantic to Pacific coasts; most abundant north of 40° latitude; reaches south into northern Mexico. Recorded from almost every state in the Union.

Comments

This is the most common of all species in the genus. Its abundance and wide distribution suggest that it might be an ancestral stock from which several other species evolved. Its great variety of food plants indicates great adaptability which is usually a trait indicating primitiveness or generalization.

Individuals vary somewhat in both size and color; large examples sometimes measuring as much as 18 mm. long, small ones no more than 10 mm.; some are dark fuscous, almost black, while others can be a rusty pale brown.

As in all other species of the genus the adults hibernate under bark or in rubbish; they can withstand extreme cold temperatures, but appear to become very lively when warmed by the rays of the spring sunlight.

Brochymena sulcata Van Duzee, 1918 (Figs. 3, 27, 28)

Van Duzee, Proc. Cal. Acad. Sci., v. 8, p. 277, 1918.

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiii, No. 1, p. 1, 1938.

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiii, No. 2, p. 89, 1938.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 204, 1939.

Head as long as the pronotum on the median line; cheeks surpassing the tylus by their own width at that point, their inner margins at the sinus parallel or diverging, not approaching or overlapping as in *4-pustulata*, their lateral tooth, rectangular. Segments 2-5 of the antennae subequal in length, the third sometimes a little longer, normally so in *4-pustulata*. Rostrum attaining the middle of the second ventral. Pronotum across the humeri a little more than twice broader than its median length; lateral margins before the sinus with four to six triangular flattish teeth that merge into the adjoining surface, the humeri with six to eight serrations or small teeth; in *4-pustulata* these teeth are more terete and calloused and sometimes curved backwards. Exserted osteolar canal tongue-shaped, narrowed at the base rather longer than the external

diameter of the tube; in *4-pustulata* lanceolate, broadest at the base and distinctly shorter; male genital segment almost attaining the outer angle of the sixth ventral segment, its apical margin transversely sulcate omitting the median smoothly rounded excavation; either side of the sulcus clothed with long pale hairs; claspers elliptical ventrally; in *4-pustulata* broad-rounded. Other characters substantially the same as in *4-pustulata*.

Color above as in allied species; beneath pale with the marginal alternation, slender edge of the segments, stigmata, a line behind them and the spot on the middle of the sixth ventral segment blackish. Femora fuscous with their bases pale, an apical and subapical spot pale, the latter often produced basally as a vitta. Tibiae with a broad median pale annulus carrying a fuscous spot on the exterior surface, the posterior rarely marked with a pale basal spot exteriorly; antennae black with the incisures slenderly pale; rostrum pale with its median line and apex black.

Holotype: Male #391, deposited Mus. Calif. Acad. Sci.

Allotype: Female; deposited in Van Duzee collection.

Paratypes: Five males and eleven females from California and Arizona.

Type locality: San Diego, Calif. (both types).

Type deposited: Mus. Calif. Acad. Sci.

Food plants: Honey locust, mulberry, apple, probably many others and possibly occurs in chaparral.

Distribution: Calif., Utah, Arizona, New Mexico, Colo., Nevada, Western Texas, probably northern Mexico and Lower California.

Comments

A very common species of the south west and western States, where by its abundance it takes the place of the more eastern *quadripustulata*. It is easily distinguished from the latter by its more ashen color, its sharper humeral angles, the more evident preapical sinus and, of course, in the male by the presence of the prominent sulcus across the apical edge of the genital cup. Newly matured females are easily distinguished from those of *quadripustulata*; but older ones in which the whitish bloom has been rubbed off tend to become brownish and the student may have trouble differentiating the individuals of the two species. One must then rely upon such structural characteristics as shape (*sulcata* being slightly more

narrowly oval than its relative), the sharper humeral angle, and the more open preapical sinus. For additional comments see the remarks concerning *B. pilatei*.

Brochymena cariosa Stål, 1872 (Figs. 4, 24-A)

Stål, Enum. Hemip., pt. ii, p. 17, 1872.

Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 30, 1904.

Van Duzee, Cat. Hemip. N. A., Univ. Calif. Pub., v. 2, p. 31, 1917.

Hart, Pentatomoidea of Illinois; Bull. Nat. Hist. Surv. Ill., v. xiii, art. vii, p. 173, 1919.

Blatchley, Heteroptera Eastern N. A., p. 100, 1926.

Brimley, The Insects of North Carolina, p. 61, 1938.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 206, 1939.

Froeschner, Amer. Midland Nat., v. xxvi, p. 135, 1941.

Jugis tyloque aequae longis; articulus secundo et tertio antennarum aequae longis vel illo hoc paullo longiore.

Nigricans, supra grisea, inequaliter distinctissime nigropunctate, punctis fortioribus in thorace scutelloque intermixtis; articulis tribus basalibus rostri, trochanteribus, basi annuloque maculari subapicali femorum nec non annulo lato tibiaram sordide flavo-albidis, hoc annulo superne nigro-maculato. ♀, long. 17 mm., lat. 8.5 mm.

Patria: Texas (Mus. Holm.)

Praecedentibus tribus statura, punctura picturaque maxime affinis, differt forma capitae, quae eadem est ac in *B. obscura*, jugis tyloque tamen aequae longis, longitudine articulorum secundi et tertii antennarum hemelytrisque hic illic minus dense punctatis et igitur, uti videtur, pallido-marmoratis. Fasciae segmentorum connexivi et maculae marginales ventris griseo-flavescentes. Rostrum apicem segmenti tertii ventris attingens vel subsuperans. Discus ventris vix pallescens. Segmentum anale maris apice late sinuatum, postice in medio levissime et quam in speciebus praecedentibus multo minus late subretusum.

Translation

Juga and tylus equal in length; second and third segments of antennae about the same length or the former slightly longer.

Blackish, gray above, very distinctly unequally nigropunctate, larger punctures intermixed on thorax and scutellum;

basal three segments of rostrum, trochanter, the base and the subapical annulus of the femur as well as a wide band on the tibia dull yellow, the latter bearing a black patch on its upper surface. ♀, 17 mm. long, 8.5 mm. wide.

Locality: Texas (Mus. Holm.)

Closely related to the three preceding species in its puncture pattern, differs in the form of the head which is the same as in *B. obscura*, nevertheless the tylus and juga are subequal, and in respect to the relative lengths of the second and third antennal segments as well as the hemelytra which are less densely punctate and therefore appear to be palely mottled or marbled. Bands on the connexival segments and the ventral marginal spots grayish-yellow. Rostrum reaching apex of the third ventral segment or barely passing it. Disc of venter hardly pale. Apical margin of terminal male segment broadly sinuate and the median posterior area very weakly and much less broadly notched than in the preceding species.

Redescription from the type specimen

Form broadly oval, the dorsal surface quite convex, more so than in allied species; general appearance ashy gray and strikingly but irregularly mottled with dark; head elongated and slightly convergent apically; ground color of head somewhat yellowish; three obscurely defined yellow longitudinal lines on head, one on the tylus and one on each inner edge of the juga; head sculpturing irregular, dark fuscous pits of various sizes; subapical tooth small meeting the margin of the jugum obtusely; width across the subapical teeth twice the length of distance from that line to apex of tylus; juga narrow converging apically but hardly reaching beyond the tip of the tylus; apex of head distinctly triangular; pronotum with calli raised but not tumid; sculpturing on disc made of fuscous to piceous shallow and deep punctures and pits of various sizes between which is a reticulum of smooth dull yellow lines; a fair indication of a smooth median yellow line on front half of pronotum; humeri acutely angled with four or five retrorse small piceous teeth; antehumeral sinus shallow and inconspicuous; marginal teeth pale, four to six in number, small and conical with interpolated smaller sharp piceous denticles; base of scutellum not appreciably raised; punctures largest, deepest and darkest near the base; apex with some large paler yellowish

areas; a broad, posteriorly dilating band of deep, piceous pits extends across each basal corner; apex rounded and bordered with deep fuscous; elytra with two transverse broad obscure bands of deep fuscous congested punctures, one about a quarter distance from base and the other about same distance from apex; basal quarter of elytra with some very evident smooth pale yellowish areas; scattered pale yellow points over remaining portion of elytra; membrane but slightly milky, almost clear hyaline; markings rich, pale, reddish fuscous; connexivum narrowly exposed; distinctly alternated fuscous and pale; the pale band with a few reddish brown punctures; under surface of head dark fuscous, almost piceous; buccula tending to be deeply sinuate apically and ending in a sharp, though short, forward projecting tooth; its frontal edge slightly concave; antennal segments almost piceous, only their incisures pale; segment two slightly longer than segment three; second joint of rostrum remarkably compressed so that there is a sharp median edge present; this segment is long, usually reaching beyond the mesocoxal cavities; thoracic sternum dull yellow, thoracic pleura gradually becoming darker to fuscous laterally; posterior edge of metapleuron yellowish; osteolar canal long, narrow at the base and spatulate apically; evaporating area pale on its inner half, dark on its lateral half; mid-portion of abdomen dull reddish, lateral portion becoming darker; each segment with a striking yellow rectangular mark on the lateral edge between the arms of dark lunes; femora reddish fuscous, a narrow basal band and a subapical annulus dull yellow; tibiae annulated, a brownish spot on front surface of each pale annulus; tarsi fuscous, second joint paler; ventral tarsal pubescence golden; male genital cup smallish for the genus, lateral lobes with a small expansion mesally and ventrally, pubescence very heavy on inner faces of cup; visible posterior ends of the claspers stubby and tapering dorsally to a small hook (Fig. 4); inner faces of clasper head semilunar in outline; inner edges of basal valves of female genital plates narrowly reflexed so that when closed the combined plates produce a compound diminutive carina between them; the reflexed edges diverge apically leaving a wedge-shaped hiatus or space in front of median valvular plate.

Holotype: Female; long. 17 mm.; max. lat. 8.5 mm.

Paratypes not specified.

Type locality: Texas (Belfrage Collection).

Type deposited: Riksmuseet, Stockholm, Sweden.

Food plants: Slash pine in southern States; probably oak and other species of pines in northern habitats.

Distribution: Florida, Alabama, Mississippi, Louisiana, eastern Texas, Arkansas, Kansas, Missouri, Nebraska, Illinois, Indiana, Tennessee.

Comments

The general color pattern of *cariosa* suggests a mottled or marbled design, somewhat like that which is occasionally seen in *affinis*, to which however *cariosa* has no close relationship. The resemblance is purely superficial; *affinis* is an oval, sub-depressed form while *cariosa* is an elliptical very convex species. The head of *cariosa* is rather long and narrow for a species in which the juga and tylus are subequal; the apex of the head in front of the sub-apical sinuses is strikingly triangular in outline, similar to that found in *lineata* and *humeralis*. The scutellum is somewhat constricted at the point where the frenum ends so that the apical third is distinctly set off from the rest of the disc, a feature that is further accentuated by the presence of a pair of clusters of piceous pits at the region of the constriction. The elytral membrane is hyaline rather than milky and the vermiculate markings are very fine and numerous, more so than in many other species. The genital cup is proportionately small for the size of the individual; it is subglobose and when fully retracted leaves a rather wide space between the tips of the seventh segment.

The species *cariosa* by its abundance throughout its range in the plains States appears to take the place of the commoner and more easterly *carolinensis* which in the northern latitudes does not extend westward beyond the Appalachian Mountains.

Brochymena lineata Ruckes, 1938 (Figs. 1-A, 24-F)

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiii, No. 5, p. 236, 1938.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 205.

Form elliptical; neither conspicuously depressed nor convex dorsally or ventrally; color in general aspect pale, being a mixture of ivory, testaceous, fuscous and black; punctures varying from minute ferruginous pin-point dots to deep, corroded black pits, the latter disposed in broad bands on the pronotum and scutellum. Head testaceous; disc between the eyes somewhat convex, in front of the eyes gradually undulating and flattened; diameter behind the eyes just about equal to that in front of

them so that eyes appear to protrude; sides of head from eyes to subapical teeth feebly converging, very nearly parallel, their edges weakly concave; subapical teeth in female small and rectangular to obtuse, in male more obtuse and less conspicuous; gena converge to an acute apex; diameter across subapical teeth about three times as long as distance between that line and apex of head; punctures mostly ferruginous, some nigro-fuscous ones found at base of tylus and surrounding area. Edge of bucculae strongly sinuate and ending anteriorly in a very prominent, latero-divergent, acute tooth; the edges of the bucculae and margins of the gena, at least in the females, ivory and smooth, in the males testaceous. First and second antennal segments reddish-fuscous, others deeper fuscous to piceous; *the basal fifth of segment four distinctly flattened or compressed and more smooth than the remaining portion of the segment*; segments two to five subequal in length, with segment five shortest; in one male specimen segment two is distinctly longer than the others. Median length of the pronotum equal to that of head; diameter across humeri about one-sixth greater than median length; disc irregularly undulating with a median, weak ivory or pale carina on front half; the carina becomes obsolete on hind half; *two prominent smooth ivory colored irregular longitudinal bars on posterior half*, each one about midway between the midline and the respective humerus; between the carina and each of these ivory bands appears a *broadish subrectangular area of large deep, corroded pits, nigro-fuscous to piceous*, some of these having smooth ivory or pale borders; several shallowly depressed or excavated areas on disc; calli somewhat raised and irregularly smooth; edges of pronotum weakly convex arcuate bearing six to eight ivory, conical teeth which blend with the dull yellow edge of the disc; humeri subtriangular, slightly tumid, the edges with four or five retrorse serrations. Propleuron with an arcuate sulcus just underneath the margin of pronotum; this sulcus subtended by a punctured area at least no appreciable amount of smooth showing; the punctures more or less evenly distributed and of medium size; propleuron becoming darker laterally toward sulcus and paler toward prosternal region; the sulcus appears as a dark fuscous groove. Scutellum long and narrow for this genus; basal third somewhat tumid with a broadish median carina continued to apical third; basal angles in the form of deep, corroded, nigro-fuscous pits; *median to these a short ivory or pale*

bar, impunctate and continuous with a similar one on the pronotum; this pale bar followed medially by a broad, rugose band of nigro-fuscous pits which extend posterior to the claval edge of scutellum; this area in turn followed medially by a very irregular longitudinal stripe that becomes punctured with ferruginous and fuscous pits toward the inner edge; apical third of scutellum paler, with smooth areas becoming larger; the scutellar carina with an irregular row of large fuscous punctures. Elytra pale to testaceous with *very uniform fuscous punctures evenly distributed* and tending to coalesce toward the apical end; the highest point on the elytra usually impunctate and pale. Membrane clear with rich ferruginous vermiculate and arborescent markings. Edges of the abdomen not excessively explanate, rather less so than is common for this genus, the outline being elliptical and abdomen somewhat tapering posteriorly; greatest width of the entire body across humeri; *greatest width of abdomen distinctly less than that across humeri*, abdomen alternated with testaceous and fuscous, the narrow band each side of the incisures being testaceous. The venter bright testaceous with incisures between segments distinctly dark fuscous, as are also the stigmata, a thin line behind them and a smooth spot near them; punctures on the venter are of medium size, fuscous to reddish and irregularly scattered, tending to concentrate laterally; sixth ventral of the female with five to seven fuscous blotches, one median and two or three laterally across segment; basal valves of female genital plates with an inner border of fuscous or dark. Femora dull testaceous with fuscous maculations arranged in longitudinal vittae which coalesce distally and there interrupted by a partially complete pale annulus; tibiae conspicuously annulated; the exterior surface of the pale band with a small dark blotch, smallest on the fore tibia and becoming increasingly larger on the middle and hind. Proximal two joints of the tarsi distinctly pale above, otherwise fuscous; claws and remaining joint fuscous. Beak reaching past the middle of the third ventral. Metasternal osteole and canal small though conspicuous because of contrasting color; osteolar cone and crater ivory or very pale, auricle deep fuscous almost piceous, narrowed at base and spatulate distally; evaporating area small, its lateral edge cutting obliquely across the surrounding disc, area pale, testaceous, surrounding regions darker. Male genital cup small for this genus, *rounded, without any conspicuous outgrowths of lateral expan-*

sions; the lateral corners do not reach even close to the ends of the sixth ventral segment; posterior edge across cup, excluding a shallow median excavation, provided with a very shallow, obsolescent sulcus; pubescence very short and fine, not silky; proctiger very wide and testaceous-fuscous to fuscous; claspers almost piceous and smallish.

Holotype: Female, Patagonia, Sonoita Creek, Santa Cruz Co., Arizona, 7/23/37. Deposited in the American Museum of Natural History. 16.5 mm. long; 8.5 mm. across humeri.

Allotype: Male, Patagonia, Sonoita Creek, Santa Cruz Co., Arizona, 7/23/37. Long. 16 mm.; width across humeri 8 mm. Author's Collection.

Paratypes: One female, Williamson Valley (E. D. Ball), 6/22/35; one female, Fort Wingate, N. M., 3/15/08; these specimens in the collection of the Academy of Natural Sciences, Philadelphia.

Type deposited: American Museum of Natural History, N. Y. C.

Food plants: White-leaf oak (*Quercus hypoleuca* Englm.); possibly also pines found within its range.

Distribution: Known only from the type records, *i.e.*, Arizona and New Mexico.

Comments

While the records show that this species occurs in both New Mexico and Arizona, in the latter state it appears to be very local. All the specimens collected by the author were taken from white-leaf oak in the Sonoita Creek Valley. The late Dr. E. D. Ball told me that he found it feeding on that tree. The species is easily identified as it can be readily distinguished by the pair of ivory calloused bars across the pronotum and scutellar base. It seems to show closest affinity to *cariosa* in so much as the male genital cup and claspers are similar and in having the second antennal segment ordinarily longer than the third. The elytral membrane, however, is not as clear as in that species and the vermiculate markings are much coarser and paler. Whereas the venter in *cariosa* tends to be dark, almost nigro-fuscous in some cases, with a conspicuous pale blotch at the lateral margin of each abdominal segment, the venter of *lineata* is lighter fuscous and the pale blotches are ill-defined. The very narrow whitish border on the edge of the abdomen is also a distinguishing characteristic.

Brochymena parva Ruckes, 1946 (Fig. 32) = *obscura* (H.-S.) 1839

Ruckes, Bull. Bklyn. Ent. Soc., v. xli, No. 2, p. 41, 1946.

- ||*obscura* Herrich-Schaeffer, Wanz. Ins., pt. v, p. 68, fig. 513, 1839; pt. vii, p. 59, 1844. (*Halys.*)
 Stål, Enum. Hemip., pt. 2, p. 16, 1872.
 Uhler, Bull. U. S. Geol. Geog. Surv., v. i, p. 283, 1876.
 Distant, Biol. Centr. Amer., Heter., v. i, p. 52, 1880.
 Uhler, Proc. Ent. Soc. Wash., v. ii, p. 368, 1893.
 Uhler, Proc. Cal. Acad. Sci., Ser. 2, lv, p. 228, 1894.
 Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 29, 1904.
 Barber, Bklyn. Inst. Bull., v. 1, p. 257, 1906.
 †*tenebrosa* Distant, Biol. Centr. Amer., Hemip.-Heter., v. i, p. 52, 1880.
 Kirkaldy, Cat. Hemip., v. i, p. 192, 1909.
 Van Duzee, Cat. Hemip. N. A., Univ. Cal. Publ., v. 2, p. 31, 1917.
 Van Duzee, Proc. Calif. Acad. Sci., v. xii, pt. i, p. 126, 1923.
 Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 204, 1939.
 Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiii, p. 10, 1938.

Form oval, small, with head form similar to *B. cariosa* Stål; body quite convex apparently more so than in *cariosa* due to smaller size; ground color dark testaceous with pits, punctures, calli, and markings on legs deep fuscous or piceous giving a dark brown appearance to the individual; edges of head in front of eyes concave, frequently sinuate with narrowest diameter about midway between eyes and subapical teeth; edges of juga straight or very weakly arcuate, converging to form a narrowly truncated apex to head; apex of each jugum acute; juga hardly longer than the tylus, if so then a very small rectangular sinus there; subapical teeth forming acute angles with juga, their tips upturned somewhat; disc of head between the eyes more convex than rest of head.

Pronotal area about the calli distinctly swollen, tumid, almost gibbose; propleuron, mesad to margin, likewise swollen so that prothorax is very thick through the calli ventrally, almost globose; pronotal collar distinctly set off from adjacent swollen areas; marginal teeth very small, almost needle-like, sharp and very few in number, not more than four, usually two or three, wide-spaced, sometimes with minute denticles between them. [The character of the marginal teeth was for a long time used to identify *Brochymena obscura* (H.-S.).] Humeri convexly

thickish, terminating laterally in an acute small tooth, this frequently directed backwards; front edge of humerus with three of four very small retrorse serrations, these sometimes obsolescent; antehumeral sinus evident with adjacent impression prominent; coarse pits of pronotum irregularly placed and no design evident; scutellum with punctures coarse and irregular in contrast with finer and very evenly crowded ones of elytra; the usually vague median impunctate line from tip of head to apex of scutellum present; base of scutellum distinctly raised, more so than in allied species but not as much as in species of the *arborea* group; sometimes base of scutellum is higher than adjacent area of pronotum and the transverse sulcus between these two is very marked; wing membrane somewhat milky arborescent and vermiculate markings strong.

Antennae thin and weak for this genus; segment two only about one-twelfth as thick as long (in *quadripustulata* this ratio is about one-sixth to one-eighth); other segments in proportion; segment one with a reddish tinge, others almost piceous with only the incisure of proximal two or three segments pale; segment three longer than segment two, and five shorter than four, sometimes the latter ratio very marked. Fore tibiae stubby, about one-sixth as wide as long (in *quadripustulata* this ratio is about one-eighth or one-ninth); tibiae annulated as in related species, the dark spot in the pale annulus just about filling the width of the annulus but usually not coloring the carinate edge of the tibia; metasternal evaporating area entirely dark, only the crateriform base and orifice pale; auricle piceous, in length about twice the diameter of the orifice, thin and spatulate in outline with a partial twist to it. Median third of abdominal venter pale, testaceous, almost impunctate; laterally on each segment punctures become reddish to dark fuscous and form dark, sometimes almost piceous, lunes, similar to allied species; each lune enclosing an almost semi-circular pale, nearly impunctate blotch.

Male genital cup much like that in *quadripustulata* but its color and contents paler; posterior border as seen ventrally, broadly U-shaped, somewhat broader than in *quadripustulata* and the surface just below the middle of the U a little more impressed or concave. Apical edge of terminal female segment, as seen from above, straight to weakly sinuate, color of disc piceous except for two lateral subtriangular patches and marginal edge which are pale. This plate has some fine scattered punctures on it.

Described from twenty-five specimens as follows:

Lectotypes: Male: 13 mm. long; 6.5 mm. across humeri; Globe, Arizona, 7/20/37. Deposited in the American Museum of Natural History. Female: 14 mm. long; 7 mm. across humeri; Globe, Arizona, 7/20/37. Deposited in author's collection.

Paratypes: Author's collection: Males: Santa Rita Mts., Ariz., 6/15/36; Tucson, Ariz., 8/15/05, 5/10/30, 6/25/35, 8/15/37; Wilcox, Ariz., May, 1937; Huachuca Mts., Ariz., 8/23/05. Females: White Mts., Ariz., 7/12/36; Wilcox, Ariz., Sept., 1936; Tucson, Ariz., 8/15/37 and one labeled Arizona 1923. American Museum Collection: Males: Concepcion Bay, Cal., 4/6-10/11; Sierrita, Ariz., 7/29/16; Van Horn, Texas, 5/22/32; Port Ballandra, Carmen Isl., Gulf of California, 5/22/21. Females: Tucson, Ariz., 10/2-25/16 (four specimens); Sonora, Mexico, 9/13/20; Tucson, Ariz., no date; (Slosson Collection) Ac. No. 26226; Van Horn, Texas, 5/22/32; Port Ballandra, Carmen Isl., Gulf of California, 5/22/21.

Type locality: Globe, Arizona.

Type deposited: American Museum of Natural History, New York. (Also see above.)

Food plants: Mesquite (*Prosopis glandulosa* Torr.) ; probably on desert oak [*Quercus arizonica* Sarg. (?)] and other chaparral vegetation.

Distribution: Southwestern Texas, New Mexico, Arizona, Mexico, Utah, California, and Lower California. Possibly also in Nevada; probably not in southern Mexico.

Comments

B. parva is the name given to the species originally described by Herrich-Schaeffer as *Halys obscura* which became quite badly confused in identification with *B. tenebrosa* (Walk.). As explained in the author's reference above (1946) it appears that Distant erred in synonymizing these.

The species averages small for the genus, individuals sometimes being no more than ten millimeters long. Although specimens of other species sometimes are diminutives and approximate this size they are never consistently dwarf.

The convexity of the propleuron and pronotal area above it makes the entire lateral thoracic portion of the insect appear swollen, so much so that the pronotal margin is almost eliminated and the few small teeth seem to emanate directly from the wall of the segment. When one is familiar with the general characteristics of the other species in the genus, the thinness of the antennae and the

stubbinness of the tibiae in *parva* stand out distinctly as valid differentiating features, as do also the narrowly arcuate tip of the head and the acuteness of the juga.

Most specimens in American collections that have been previously identified as *B. obscura* (H.-S.) or *B. tenebrosa* (Walk.) and which come from the geographic areas specified above are undoubtedly individuals that should be called *B. parva*. *B. tenebrosa* (q.v.) is an entirely different species, much larger in size and of more southern (Mexico) distribution.

Brochymena punctata Van Duzee, 1909 (Figs. 5, 29)

Van Duzee, Canadian Ent., v. xli, p. 369, 1909.

Banks, Cat. Neare. Hemip., p. 92, 1910.

Van Duzee, Cat. Hemip. N. A., Univ. Calif. Pub., v. 2, p. 32, 1917.

Blatchley, Heter. Eastern N. A., p. 102, 1926.

Brimley, The Insects of North Carolina, p. 61, 1938.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 205, 1939.

Smaller than *annulata* with the head more truncated at the apex; pronotum, scutellum and elytra distinctly dotted with smooth white points. Length 14–15 mm.

Apex of head very obtusely angled, almost truncated, inner angle of cheeks scarcely meeting over apex of tylus. First antennal joint almost attaining the tip of the head, second and third respectively longer, the fourth equal to the third. Pronotum hardly as wide as in *annulata*; humeri less produced, and the anterior lobe with coarser and more irregular denticulations; the posterior lobe quite distinctly denticulate on the latero-anterior margins; the surface closely and quite regularly punctured with fuscous on a whitish ground; anteriorly with dark punctures segregated along the submargins and in two oval patches at the inner angles of the callosities; median line carinate and smooth anteriorly. Scutellum shorter and more rounded at apex than in *annulata*, punctured with blackish on a pale ground, and marked with a few scattering larger black pits and a cluster of the same at each basal angle, intercepted by an oblique pale callus. Elytra pale, with distinct dusky punctures, which become finer and confluent in areas posteriorly on the disc; the surface sprinkled with conspicuous white calloused points which are found more indefinitely on the scutellum and pronotum. Membrane more irregularly and

obscurely veined than in allied species. Connexivum conspicuously alternated. Legs, base of antennae and the rostrum ferruginous or obscure brown; the black apex of the latter attaining the base of the third ventral segment. Genital segment of the male short, of almost equal length across its whole width, the broad apical sinus subangular.

Cotypes: One male and two females.

Type locality: Georgia; no station mentioned.

Type deposited: Van Duzee Collection, University of California Museum.

Food plants: Oak (*Quercus* spp.).

Distribution: Virginia, Georgia, Florida, Indiana (?).

Comments

Little need be added to the excellent description that Van Duzee has given above. Blatchley, in his *Heteroptera of Eastern North America* adds a character that appears to be a good one, that of the median plate of the female genital valves being longer than the lateral lobes. In the male, this species is the only one in the genus, with its variety *pallida* (q.v.), that possesses elaspers, the heads of which are squarish block-shaped structures, and which nearly fill the cavity of the genital cup.

It is a most distinctive species with its rusty color and stellate points, its short, broad head with an obtuse apex, and its broadly oval form.

Apparently this is not a common species, being absent in most collections that have been examined, and seems to be restricted to the southeastern States, although Blatchley claims to have taken it in Crawford County, Indiana. While Blatchley's authority should not be questioned, it does seem rather odd that no other record exists that places this species beyond the range of Virginia, Georgia, and Florida. Such a specimen could possibly have been accidentally introduced and escaped as an adventitious individual.

Brochymena punctata var. *pallida* Blatchley, 1926

Blatchley, *Heteroptera of East. N. A.*, p. 101, 1926.

Torre-Bueno, *Entomologica Americana*, v. xix, No. 3, p. 205, 1939.

Oval, subdepressed, small for the genus. Grayish-white with numerous small fuscous punctures; pronotum and scutellum with a number of widely scattered coarse, deep black punctures, these aggregated to form an oval spot at each basal angle

of scutellum; also with numerous elevated smooth white spots, the most conspicuous of these being near middle of front lobe of pronotum and each side of scutellum; antennae dark reddish-brown; connexivum with alternate bars of fuscous and pale gray; under surface dull grayish white with scattered very small fuscous punctures and thickly clothed with white hair-like bloom; legs dull yellow mottled with purplish dots. Head relatively short, its apex obtusely angled or subtruncate, cheeks reaching tip of tylus; subapical sinus and tooth scarcely evident. Beak reaching base of second ventral. Bucculae with a preapical tooth. First antennal reaching the sinus of cheeks, second one-fourth longer than third. Side margins of pronotum armed both before and behind the sinus with short, regular subacute teeth. Scutellum shorter and more rounded than in *carolinensis*. Osteole with tube shorter, its auricle smaller than in the two preceding species (*cariosa* and *myops*). Genital segment of male short, shallowly emarginate behind, the notch with a short median lobe. Lateral lobes of the female genital plate distinctly surpassing the oblong median lobe. Length 13-15 mm.; width 7-9 mm.

Cotypes: One male and one female.

Type locality: Sanford, Florida (March 25th).

Type deposited: Purdue University Museum, Indiana.

Food plants: Unknown, but likely to be on oaks and pines.

Distribution: Known only from Florida type locality.

Comments

Blatchley says that this species is closely related to *B. punctata* Van D. I have had the opportunity of examining the type specimens which were kindly loaned me from the Purdue University Museum's collection and after careful study have found that the structural differences, other than color, between *pallida* and *punctata* are so slight that there is no very good reason to keep *pallida* as a valid species. The male genitalia are identical, and although there is a minor difference in the female genital plates of the two, the variation is within the limits that one can expect and within those shown by other species in this genus. In general the facies are quite similar, Blatchley's *pallida* being of course the paler form. I do not believe that the slight differences apparent in the shape of the apical portion of the head or the relative lengths of the antennal segments are characters of sufficiently great value to differentiate

these two forms into two distinct species. Therefore, *pallida* is being relegated to the status of a variety of the typical species *punctata*. It is probably a southern variation of the Georgia type.

Brochymena dilata Ruckes, 1938 (Figs. 24-D, 33)

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiii, p. 239, photo., 1938.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 205, 1939.

Torre-Bueno, Bull. Bklyn. Ent. Soc., v. xxxv, p. 63, 1940.

Form broadly oval, somewhat depressed on top and slightly convex beneath; dorsal surface at least not as convex as in allied species; color in general aspect somewhat cinereous, being a mixture of a dull testaceous background mixed with fuscous and blackish punctures, of various sizes, each of the smaller ones provided with a whitish bloom. Head more reddish than testaceous; diameter behind the eyes much less than just in front of them, disc widest just in front of eyes and then sides slightly converging to an evenly obtuse, arcuate apex in the female and a slightly more truncated one in the male; diameter across subapical teeth about four times the distance between that line and apex of head; juga as long as tylus with their tips not touching; edges in front of eyes somewhat sinu-concave, these edges and those of the juga finely and irregularly crenoserrulate, at least not smooth; apical tooth not conspicuous and tending to be blunt, not acutely angled. Edge of the bucculae deeply sinuate and ending anteriorly in an acute prominent tooth that meets the blunt, rounded ventral extension of the gena in an inconspicuous angle. *Basal three segments of antennae reddish, distal two much darker; almost piceous; segments two to five subequal, at least none conspicuously longer or shorter than another.* Median length of pronotum as long as that of head; diameter across humeri about one-seventh greater than the median length; disc around the calli somewhat tumid in two raised areas leaving a shallow median restilinear portion excavated; two lateral obscurely circular areas also excavated, these about equidistant from front and hind margins of pronotum but closer to lateral edge than median line; some scattered large piceous pits on pronotal disc, these forming, however, *no definite pattern; small punctures numerous and very evenly distributed* reaching the very bases of the marginal teeth. Marginal teeth seven to nine in number, *bluntly rounded, uniform in size, perceptibly flattened, never conical or terete,*

sometimes with denticules at their bases; teeth either concolorous with disc of pronotum or paler, never darker; *teeth tend to point backwards*; humeri subtriangular with irregular small serrations becoming obsolete posteriorly. Propleuron with an arcuate sulcus just below the pronotal margin; *area around appreciably smooth and concolorous with remaining disc*; rest of propleuron and prosternum with scattered coarse fuscous or reddish-fuscous punctures. *Elytra with numerous substellate points and blotches*, these impunctate and pale and evenly distributed over elytra. Scutellum with a *few widely scattered large punctures*, these concentrated at the basal angles to form two small corroded areas. Edges of the abdomen *explanate and extend well beyond the costal margin* of the elytra and in the female at least form an almost *orbicular outline* to the body; *lateral diameter across widest part of abdomen at least one-sixth greater than width across humeri*; exposed edge of abdomen *not* brightly colored and *inconspicuously* alternated. Venter testaceous to reddish-fuscous with many punctures of various sizes scattered irregularly; sparsely clothed with an inconspicuous tomentum. Femora with maculations arranged in incomplete longitudinal vittae which terminate in a distal irregular piceous area which is broken medially by a rectilinear pale blotch; *tibiae distinctly reddish to reddish-fuscous and without annuli or maculations of any kind*; tibiae more slender and more uniform in diameter than in related species; the sulcate face slightly darker than posterior surface; tarsi and claws fuscous. *Male genital cup with lateral wings conspicuously protruding ventrally and medially*, not laterally, into a pair of thickish, darker, rounded lobes, the dorsal surface of which is clothed with short soft hairs; exposed face (medial aspect) of dorsal ramus of claspers semicircular in outline and piceous in color, shining; proctiger broad and deep fuscous with a paler reddish median stripe. Membrane with veins strikingly fuscous on an obscurely milky-hyaline background. Basal valves of female plates somewhat convex, at least more so than in allied species; the distal valves not reaching the edge of the eighth tergites; median plate of valves broadly triangular with a concave posterior edge. Auricle of the metasternal canal elongated, tongue-shaped, narrowed at the base and several times as long as the external diameter of the orifice; the auricle has a partial spiral twist to it; the evaporating area and the crateriform of the base of the orifice are not conspicuously different in color from the surrounding area.

Holotype: Female, White House Canyon, Santa Rita Mts., Santa Cruz Co., Ariz., 7/21/37. Coll. H. Ruckes, deposited in American Museum of Natural History. 18.25 mm. long; 9.5 mm. across humeri; 11.5 mm. across abdomen.

Allotype: Male, same data, deposited in author's collection. 17.5 mm. long; 9 mm. across humeri; 10.75 mm. across abdomen.

Paratypes: One female in author's collection.

Type locality: Santa Rita Mts., Santa Cruz Co., Arizona.

Type deposited: American Museum, N. Y. C.

Food plants: Unknown.

Distribution: Arizona; Hot Springs, New Mexico; Salt Lake City, Utah; possibly northern Mexico. In the collection of the late William T. Davis there was a specimen of this species which was labeled "Chisos Mts.," presumably from Texas. It was wrongly identified as *B. quadripustulata*; apparently the example was lost or given away without a record of its disposal.

Comments

This species, while apparently uncommon and somewhat spotty in its distribution, is easily recognized by its almost orbicular abdomen, the inconspicuous antehumeral sinus, the fineness of its many punctures, its dark color and concolorous tibiae and, in the male, by the presence of large lobes developed ventrally and medially of the lateral corners of the genital cup. The heads of the claspers indicate relationship to *punctata* in that they are large block-shaped hooks on the crest of which is a pair of blunt crenulations with a weak saddle between them; in *dilata* the meso-posterior face of each clasper head is semicircular while in *punctata* it is distinctly squarish.

One specimen in the collection of the National Museum, Washington, D. C., has the fore tibiae not immaculate, as stated in the description, but provided with a vague, inconspicuous annulus near the knee.

Brochymena myops Stål, 1872

Stål, Enum. Hemip., pt. 2, p. 16, 1872.

Uhler, Bull. U. S. Geol. Geog. Sur., v. 1, p. 283, 1876.

Uhler, Proc. Bost. Soc. Nat. Hist., v. xix, p. 373, 1878.

Distant, Biol. Cent. Amer., Hemip.-Heter., v. i, p. 51, 1880.

Bueno and Brimley, Ent. News, v. xviii, p. 441, 1907.

Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 29, 1904.

Van Duzee, Canad. Ent., v. xlv, p. 318, 1912.

Van Duzee, Cat. Hemip. N. A., Univ. Calif. Pub. v. 2, p. 30, 1917.

Blatchley, Heterop. Eastern N. A., p. 100, 1926.

Brimley, The Insects of North Carolina, p. 61, 1938.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 203, 1939.

† *quadripustulata* Herrich-Schaeffer, Wanz. Ins., v. vii, p. 57, fig. 729, 1884.

4-notata Provancher, Nat. Can., v. iv, p. 74, 1872.

Uhler, Check List, p. 8, 1886.

Thorace marginibus lateralibus anticis pone sinum integris vel inermibus, ante sinum rotundatis, callosis, laeviusculus et obtuse dentatis; scutello ad angulos basales laeviusculo, hac parte laevi intus serie subobliqua punctorum acervatorum, extus impressione marginali longitudinali continua fortiter nigro-punctata terminata; margine costali basin versus laevigato.

Translation

Lateral anterior thoracic margin entire and unarmed, in front of the sinus (humeral) rounded, calloused, somewhat smooth and obtusely dentate; scutellum at basal angles somewhat smooth which smooth part is traversed by a series of sub-oblique rough punctures or pits which become more strongly nigro-punctate towards the longitudinally impressed margin; base of costal margin levigate.

Redescription of the Type

Large species, form very broadly oval, robust; general color dull brownish yellow with varying sizes of dark fuscous punctures and pits; head with a continuous longitudinal smooth stripe (apparently variable) continuous with a median one on the front half of the pronotal disc; subapical teeth of juga broad and blunt, apex of head short and triangular, juga converging slightly over the tip of the tylus, but not contiguous with each other; pronotum strikingly marked with an elliptical smooth pale area at the posterior inner angle of each callus; calli mediumly raised and irregularly punctate; humeri thick, obtusely angled and edentate; sinus not very deep and margin in front of it thick, smooth, light yellow with four to six blunt, stubby, pale yellow teeth; punctures of pronotal disc variable, pit-like ones just posterior to the two large smooth areas; basal

third of scutellum not much raised and continued as a very broad flattish ridge to the distal third; a broad band of black, transversely elliptical pits cutting obliquely across the basal corners of scutellum, each lateral third of scutellar base smooth and dull yellow with scattered deep fuscous punctures of various sizes; edge of the posterior third of scutellum deep fuscous; an irregular band of congested shallow punctures appears each side of the median raised line; punctures of elytra of rather uniform size and even distribution; punctures slightly more dense in vicinity of high discal point; membrane clear hyaline, suffused with dusky; arborescent markings dark brown; edge of connexivum dull yellow, remaining portion not conspicuously alternated; under surface of the head and juga pale; antennal segments two and three rufous (in type but not necessarily so in other examples), segments one, four, and five deep fuscous; segment two subequal to segment three or but slightly shorter; edge of buccula hardly sinuate, ending in a blunt, rounded, pale tooth; pro-, meso-, and metasterna evenly colored and more or less evenly punctured; a darker smooth blotch between the pro- and mesocoxae; propleuron with a prominent smooth, dark fuscous crescentic area just below the margin of the pronotum; metasternal evaporating area slightly impressed in the surrounding disc, dull brownish orange in color; auricle slightly darker than evaporating area, short and blunt; femora distinctly red immaculate except for dark, almost black incomplete annulus at apices; tibiae strikingly annulated with fuscous and pale yellow, the pale annulus with a dark patch on its anterior face; tarsi uniformly deep fuscous; abdomen essentially impunctate and graduating from pale rufous medially to dark fuscous laterally; male genital cup like that in *carolinensis* but with more prominent auricular edges on the parameres; proctiger without a median keel, uniformly dark.

Type: Male; 19 mm. long; 11.5 mm. wide.

Paratypes: Not stated.

Type locality: Stål described the species as coming from New Orleans, La., the type specimen however bears a label reading "Mexico."

Type deposited: Riksmuseet, Stockholm, Sweden.

Food plants: Never definitely stated; probably various species of pines in its habitat. Provancher collected his *B. 4-notata* from sweet gum (*Liquidambar styraciflua* Linn.).

Comments

This is the largest and most colorful species of them all. In fresh specimens the bright yellow (almost orange) coloring stands out in sharp contrast with the drab brown-gray background. It is, needless to say, the species most easily identified.

The relationship to *carolinensis* is evident due to the similarity of the structure of the claspers and male genital cup.

Individuals appear to occur common locally, being taken in considerable numbers when and where it appears. However its distribution is rather spotty. Numerous records are listed from various stations in North Carolina, but in Texas, Louisiana, Georgia, Alabama, and South Carolina individuals have been taken at only isolated places. The record from New Mexico is questionable; the record was established years ago by Uhler when species of the genus were not too well known and could easily have been misidentified at that time. The record is accepted with reservations, the author being of the conviction that the New Mexican specimen could have been, in reality, an over-sized example of *B. hoppingi* Van D., in fact such an erroneous identification was made by him in 1937.

Brochymena carolinensis (Westwood), 1837 (Figs. 6, 30, 34, 37)

Westwood, Hope Cat., v. i, p. 22, 1837. (*Halys.*)

Dallas, List of Hemip., v. 1, p. 189, 1851.

Stål, Enum. Hemip., pt. 2, p. 17, 1872.

Distant, Proc. Zool. Soc. Lond., p. 823, 1900.

Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 29, 1904.

Kirkaldy, Cat. Hemip., v. i, p. 191, 1909.

Van Duzee, Cat. Hemip. N. A., Univ. Calif. Pub., v. 2, p. 31, 1917.

Blatchley, Hemip. Eastern N. A., p. 102, 1926.

Leonard, A List of the Insects of New York, p. 78, 1926.

Brimley, The Insects of North Carolina, p. 61, 1938.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 203, 1939.

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxvi, p. 27, 1941.

||*annulatus* Fabricius, Syst. Ent., p. 704, 1775. (*Cimex*).

Goeze, Ent. Beytr., v. ii, p. 238, 1778. (*Cimex*.)

Fabricius, Spec. Ins., v. ii, p. 347, 1781. (*Cimex*).

Fabricius, Mantissa Ins., v. ii, p. 285, 1787. (*Cimex*).

Gmelin, in Linnaeus, Syst. Nat. Edn. 13, v. i, pt. 4, p. 2139, 1788. (*Cimex*.)

Fabricius, Ent. Syst., v. iv, p. 100, 1794. (*Cimex*.)

Fabricius, Syst. Rhyng., p. 182, 1803. (*Halys.*)
 Herrich-Schaeffer, Wanz. Ins., v. vii, p. 57, fig. 728,
 1844. (*Halys.*)

Stål, Enum. Hemip., v. ii, p. 16, 1872.

Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 30, 1904.

Bueno and Brimley, Ent. News, v. xviii, p. 442, 1907.

Van Duzee, Can. Ent., v. xli, p. 369, 1909.

†*serrata* Wolff, Icon. Cimic., v. v, p. 184, fig. 178, 1811.
 (*Halys.*)

harrisii Uhler, Proc. Bost. Soc. Nat. Hist., v. xiv, p. 95,
 1871; v. xix, p. 373, 1878.

Fusca, nigro-punctatissima, capite antice, integro, thoracis lateribus spinuloso-serratis angulis posticis parum prominulis; hemelytris punctis duobus nigricantibus, membrana apicali albida nervis 4 longitudinalibus, pulcherrime ramulosis, plaga interna nigricanti, femoribus fascia ante apicem tibiisque fascia media pallida. Long. corp. lin. 8.

Translation

Fuscous, very finely punctate, apex of head entire, lateral margin of thorax sharply-serrate, posterior angle weakly produced; hemelytra punctured with two blackish points, apical membrane white with four longitudinal nerves, beautifully ramifying, and an inner spot darker, a subapical band on the femora and a median band on the tibiae pale. Length of body, 8 lines.

Redescription of Specimen Compared with Type

Form broadly oval; cinereous-brown, in fresh specimens provided with a whitish bloom causing individuals to appear beautifully mottled; worn specimens become almost concolorous fuscous. Head widest before the eyes, its sides weakly concave and converging anteriorly; subapical teeth prominent and their sinuses rectangular, their tips rectangular to acute; head in front of subapical teeth triangular; juga somewhat longer than the slightly deflexed tylus leaving a preapical sinus about as deep as the width of the tip of one jugum; disc of head not very undulant and with dark punctures more or less parallel between thin, sinuate, laevigate longitudinal paler stripes; eyes prominent; disc of pronotum somewhat undulant with a very deeply impressed area adjacent to each antehumeral sinus; area of the

calli raised and irregularly pitted between smooth patches; median quarter of disc more finely punctate than rest; dentate margins distinctly convexly arcuate and provided with numerous strong peg-like teeth, between which are minute denticles; humeri strong and ending in an acute tip somewhat produced; frontal edge of each humerus with retrorse serrations above which is a prominent thick crest; narrow posterior border of pronotum and a similar border across base of scutellum, declivent, producing a shallow but easily recognized sulcus transversely between the two; surface of scutellum irregular, somewhat convexly faceted; an elongate cluster of large, deep piceous pits at and behind the basal angles; a few large scattered punctures irregularly distributed between finer ones of disc; no median carina present but the center of the scutellum is convexly, but weakly raised; apical edge bordered with a darker crescent; elytra with uniform and evenly distributed small punctures, only the basal area of the costal margin smooth; discal point pale and prominent; elytral membrane slightly milky to hyaline with beautiful, rich arborescent and vermiculate markings, the basal two-thirds of which are rufous to ferruginous while the distal ones are deep fuscous; the submarginal brown border is very narrow and close to the edge of the membrane; lateral two-thirds of the connexivum raised above the level of the abdominal disc, producing the effect of the elytra being impressed into the dorsum (Fig. 37); connexivum not as strikingly alternated as in many other species; each segment with three color bands, two dark fuscous ones between which is a lighter one, each subequal in width; apical edge of terminal female segment very weakly sinuate transversely; under side of head longitudinally lineated dark fuscous and light fuscous; buccular edge sinuate towards its acute apical tooth, which has a concave frontal edge; frontal edge of jugum truncated and meeting the base of the apical tooth at a right angle; antennal segments one, two, and basal two-thirds of three, dull reddish brown, apical third of segment three and segments four and five almost piceous, except for a narrow annulus at the base of segment four, which is yellowish; this annulus is present in the type specimen, in the specimen compared with the type and several others in my collection; it appears to be a very variable character and can be discounted; segment three at least half again as long as segment two; median half of pro-, meso- and metasterna pale, except for a

darker patch between the pro- and mesocoxae; propleuron somewhat swollen with a deep crescentic sulcus parallel to the underside of the pronotal margin just below the marginal teeth; lateral half of each pleural segment becoming gradually darker, the metapleuron being the darkest; metasternal evaporating area paler and slightly impressed in its plate, orifice oblique, auricle darker, spatulate and without a spiral twist; abdominal venter dull reddish or yellowish brown medianly, darker laterally; punctures extremely fine and provided with short sericeous vestiture; while the lateral piceous lines are not as distinct as in many allied species, there is a central pale marginal blotch about half the width of the edge of each segment; female genital plates essentially concolorous, basal valve only convex, not tumid.

In the male the genital cup is transversely elliptical with the opening, as seen from the posterior, somewhat lunate in outline; the lower lip is somewhat up-turned or deflexed with a weak impression medianly and its edge is centrally excavated to form a pronounced U-shaped cut; the dorsal border is complexly sinuate with a pair of strong triangular teeth towards the lateral tips, each such tooth overlying the head of a clasper; clasper heads slipper-shaped, lying transversely across the cup, dark fuscous to almost piceous in color; proctiger likewise dark with weakly concave sides and a moderate carina present, the highest point of which is pale yellow; genital cup deep with plenty of space left between its contents and walls.

Type: Female; 18 mm. long; 10 mm. wide.

Allotype: Not specified.

Paratypes: Not specified.

Type locality: "North Carolina."

Food plants: Slash pine (*Pinus caribea* Morelet), long-leaf pine (*Pinus palustris* Mill.), various oaks (*Quercus* spp.), and probably others.

Distribution: Eastern seaboard from New England to Florida, westward across Gulf States to Texas; northerly not west of the Appalachian Mountains.

Comments

The only species, together with *marginella*, that the writer knows in which the elytra appear to be impressed in the dorsal wall between the up-raised borders (connexivum) of the abdomen.

Of very common occurrence but interestingly restricted to the eastern states in its northern range. In freshly matured specimens the numerous piceous punctures are filled with a whitish bloom, giving an ashy color to the bug; this bloom rubs off quite easily so that in older or frequently handled examples the individuals tend to become concolorous and somewhat glabrous. The mottled appearance of new adults causes them to be rather inconspicuous against the rough grayish bark of pines.

The feeding activities of this species have been described by the present author in 1941 (q.v.). The food plants are predominately pine, but specimens have been taken from several other sources, particularly oak.

The individuals of *carolinensis* apparently do not vary as much in size as do many other species, such as *arborea*, *quadripustulata*, *sulcata*, and *affinis*, nor is there as extreme a variation in color as sometimes appears in forms like *cariosa*.

Brochymena marginella Stål, 1872 (Fig. 31)

Stål, Enum. Hemip., v. ii, p. 16, 1872 (as a variety of *B. annulata* (Fabr.) = *B. carolinensis* (West.)).

Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 31, 1904.

Van Duzee, Cat. Hemip. N. A., Univ. Calif. Pub., v. ii, p. 32, 1917.

Blatchley, Heter. Eastern N. A., p. 103, 1926.

Torre-Bueno, Entomologica Americana, v. xix, p. 204, 1939.

Specimina plura e Texas divergunt ab exemplis Carolinis magnitudine saepius majore, rostro paullo brevior, medium segmenti ventralis tertii tantum attingente, ruga scutelli distinctiore, margine abdominis toto anguste pallido, nec tantum in medio segmentorum macula angusta pallida notato, marginesque costali basin versus minus dense punctato, laeviusculo; an species distincta? *B. marginella* Stål.

Translation

Several specimens from Texas differ from the Carolina examples in size, being often larger, in having the rostrum somewhat shorter, just about reaching the middle of the third ventral segment, the ruga of the scutellum more distinct, the abdominal margin totally but narrowly pale, and the pale spot on each segment less raised and less evident and the costal margin somewhat smooth and less densely punctate towards the base; a distinct species? *B. marginella* Stål.

Redescription from the Type Specimens

Form very large (almost as big as *B. myops*), broadly oval, dorsal surface somewhat depressed and faceted as in *B. carolinensis*; general appearance concolorous dull orange brown; head widest just in front of eyes but hardly tapering or converging anteriorly; subapical teeth blunt, smaller than in *carolinensis* and their sinuses much more obtuse; head in front of subapical teeth rather short and truncated across the apex; juga and tylus subequal, the juga raised slightly above the tylus and surrounding disc; punctures of head rather uniform in size and irregularly arranged so that there appears to be a fine smooth reticulum of dull orange brown running over the head between the punctures; surface of pronotum not distinctly undulant; calli somewhat raised but not tumid by any means; punctures more or less uniform except for a band of deeper ones just behind each callus; antehumeral sinus almost obsolete, certainly not as deep as in *carolinensis*, much more like the condition in *dilata*; anterior margin of humerus with four or five retrorse indistinct serrations; crest over top of humerus wanting; marginal teeth flattish, paler than pronotal margin, blunt and tending to be retrorse; basal third of scutellum not appreciably raised, somewhat flat-topped and continued posteriorly as an obsolescent broad ridge; a cluster of large piceous coalesced pits impressed at the basal angles and the declivent lateral faces of the raised portion; otherwise the punctures are evenly distributed; apex narrowly rounded; elytra evenly covered with light fuscous punctures that become somewhat indistinct apically; membrane clear hyaline, the basal arborescent markings rich orange brown, the distal vermiculate ones darker fuscous; marginal band narrow and close to edge of membrane; exposed portion of connexivum raised above the disc of the abdomen, as in *carolinensis*, so that it is higher than the costal margin of the elytra which then appear to be impressed into the dorsum; inconspicuously alternated; the entire edge of each segment and the incisures between them a pale dull yellow almost ivory; under surface of the head orange brown to light fuscous; buccular edges weakly sinuate, ending in a strong rectilinear tooth, this with its frontal edge vertical and straight; frontal edge of jugum like that in *carolinensis*; second rostral segment relatively short, barely reaching the middle of the mesosternum; antennal segments distinctly reddish, segment

three about half again as long as segment two; the usual dark patch between the pro- and mesocoxae present; thoracic sterna and pleura concolorous orange brown, slightly darker laterally; a fuscous crescent and distinct groove beneath marginal teeth of propleuron; metasternal evaporating area pale and impressed in its surrounding plate; osteolar canal narrowly spatulate; femora reddish brown and indistinctly mottled with dark; subapical paler annulus indistinct; tibiae with pale annuli vague and black patches on their frontal surfaces obsolescent; basal segment of tarsi reddish; others deep fuscous; ventral abdominal segments punctured more densely laterally than medianly; ground color of venter dull orange brown; genitalia in both sexes similar to those in *carolinensis*, but proportionately larger; proctiger in male with a more distinct keel and sides slightly more concave; high point of keel pale yellow.

Holotype: Male; length 18.5 mm.; width 10 mm.

Allotype: Female; length 20 mm.; width 11 mm.

Paratypes: Not specified.

Type locality: "Texas." Harris County.

Type deposited: Riksmuseet, Stockholm, Sweden.

Distribution: Texas. Also recorded from Florida (Osborn Coll.).

Food plants: Probably the same as those used by *B. carolinensis*.

Comments

The only specimens that the writer has seen are the two types and one of doubtful status in the collection of the U. S. National Museum. A specimen of this species is said to be in the Osborn collection but this I have not seen. The locality of this example is stated as Florida, but no definite station is given.

The type specimens have proportions that resemble *myops*, being stout and big, but the structural characters are more nearly those of *carolinensis*. There is no doubt that all three of these species are closely related; the parameres alone are evidence of that fact.

Brochymena tenebrosa Walker, 1867 (Figs. 24-E, 38)

Walker, Cat. Heter., pt. i, p. 231, 1867.

Distant, Biol. Cent. Amer., Heter., v. i, p. 52, pl. 6, fig. 5, 1880.

Kirkaldy, Cat. Hemipt., v. i, p. 192, 1909.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 204, 1939.

Ruckes, Bull. Bklyn. Ent. Soc., v. xli, p. 41, 1946.

†*obscura*, Distant, Biol. Cent. Amer., Hemip.-Heter., v. i, p. 52, 1880.

usingeri, Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiv, p. 114, fig. 2, 1939.

Pallide flava, elliptica, asper punctata, nigro-conspersa; caput brevisculum lateribus anticis angulatis, lobis lateralibus lobum medium paullo superantibus; rostrum apice nigrum, coxas posticas paullo superans; antennae nigrae, corpis dimidio non longiores; thorax lateribus serratis, angulis positis obtusis; venter rufescens, sulcatus lituris lateralibus nigris; pedes nigri, robusti; femoribus testaceis nigro conspersis, tibiis testaceo fasciatis; membrana lituris ramosis fasciaque submarginali nigricantibus.

In addition to the above Latin description Walker gives the following more elaborate English version. Hence there is no need of translating the above.

Pale yellow, elliptical, roughly punctured, punctures black, here and there clustered with intervening smoother spaces. Head much shorter than the thorax with an angle on each side in front, lateral lobes extending a little beyond the middle lobe. Eyes prominent. Rostrum black towards its tip, extending a little beyond the hind coxae. Antennae black, about half the length of the body; first joint not extending to the front of head; joints two to five successively slightly increasing in length. Thorax with a very slight transverse impression; sides serrated, hind angles obtuse, not prominent. Scutellum slightly attenuated with a slight keel which is forked towards the fore border. Abdomen with black lateral spots; underside reddish, almost smooth, with black marks on each side and with a furrow which extends to the hind border of the fourth segment. Legs black, stout; femora testaceous, black speckled; tibiae with a testaceous band. Fore wings more finely punctured than the thorax; membrane cinereous with some blackish ramose marks and with an excavated submarginal band. Length of body 8 lines.

Redescribed

Form narrowly oval, somewhat depressed; venter not appreciably convex; color, median fuscous with a tinge of reddish, shiny; diameter of head in front of eyes slightly wider than

distance from that line to apex of head; sides very slightly converging; juga longer than the tylus and exceeding it by about a length equal to the width of one jugum at that point; inner margins of juga lobes parallel so that a conspicuous rectangular sinus appears between them; subapical teeth broadly triangular; distal half of tylus, apical lobes of juga and a third of the subapical teeth, impunctate and pale; punctations of the head irregular with a tendency to coalesce; pronotum with antehumeral sinus weak and inconspicuous, so that front edge of humerus and margin of pronotum are nearly a continuous line; front half of pronotal disc with irregular punctures, many coalescing into corroded areas about the calli; front half of disc provided with obliquely elongated, smooth, irregular island-like, raised, pale areas; posterior half of disc with regular and rather uniform circular nigro-fuscous punctures of medium size; crest of each humerus with a prominent oblique smooth pale band; just inside of this an oblique rugose band of broad black punctures cuts across the shoulder; marginal pronotal teeth concolorous with the pale markings of head and pronotum; teeth four to seven in number with smaller ones interpolated between them; humeri with one or two minute crenulations at the most, otherwise edentate; a striking character lies in the flat-topped nature of the raised basal portion of the scutellum, the whole surface appearing truncated as in *B. affinis*. This region is suffused with reddish; the posterior faces of this raised portion become declivent and a broad median elevation, broader than a carina, extends to the apical third of the shield; the frenum ends posterior to the middle of the scutellar edge so that the apical tongue appears to be proportionately short; punctures on the basal raised portion large, deep and irregular, tending to coalesce at the lateral thirds, there forming a broad, oblique corroded band just inside the basal corners; the basal angles furnished with one or two large, deep piceous pits; middle portion of scutellum with rather uniform nigro-fuscous shallow punctures of medium size; punctures at the apical fifth suddenly become much smaller and more condensed; elytral punctures small, shallow and regular, interspersed with numerous small irregular smooth points; membrane hyaline somewhat infused with deep orange brown, the veins and vermiculate markings darker reddish fuscous not outlined by a pale border of membrane; exposed edge of connexivum alternated with dull yellow and dark brown, punctures small and scattered; incisures

between the segments raised and pale; posterior angles of abdominal segments inconspicuous and distinctly obtuse; edge of the buccula sinuate and ending in a prominent stout acute tooth which tends to be concave on its front edge; basal antennal segment tends to be paler than remaining four which are nigro-fuscous; segment two somewhat shorter than segment three; segments three, four and five subequal; fore tibiae stoutish and gradually dilating toward the apex; femora with fuscous maculations tending to coalesce into longitudinal vittae; a longitudinal pale stripe on front and back surfaces of the femora; a subapical incomplete pale annulus present, this most noticeable on the fore femora; tibiae annulated as in allied species; second joint of each tarsus pale above, other parts fuscous; metasternal evaporating area conspicuously pale with a contrasting dark auricle which tends to be acute and is well raised above the surrounding disc; ventral abdominal color dull orange brown with a few widely scattered inconspicuous punctures, these most abundant laterally where they become darker and form horse-shoe-shaped designs near the edge of each segment; lateral borders of the first two or three ventral abdominal segments weakly transversely rugose or milled, the milling becoming evanescent on posterior segments; rostral groove long, broad and shallow, the beak reaching at least the middle of the second visible segment; inner apical corners of basal valves of female genital plates reddish brown, together forming a dark narrow triangle in the middle of the genitalia; narrow mesal border of each basal plate slightly impressed, certainly not raised or reflexed; male genital cup similar to that of *B. carolinensis*; the upper surface of each clasper broadly oval in outline, the under surface provided with a high carina and lateral spur. Size—Male: 16.75 mm. long; 8.5 mm. across humeri. Female: 17.5 mm. long; 9.5 mm. across humeri.

Type: Male; length 8 lines.

Allotype and paratypes: Not specified; apparently only one specimen used for description.

Type locality: Oajaca, Mexico.

Type deposited: British Museum, London.

Food plants: Unknown.

Distribution: Guerrero, Temescaltepec, Southern Mexico; many specimens in American collections identified as this species are probably *B. parva* Ruck. (q.v.).

Comments

Considerable confusion has existed as to the identity of this species. Unfortunately Distant in 1880 placed the species, known up until that time as *B. obscura* (H.-S.), in synonymy with *B. tenebrosa*. Authorities subsequently accepted Distant's decision as valid and thereafter identified specimens that conformed to the facies of *B. obscura* as *B. tenebroša*. In a recent paper the author has pointed out the incorrectness of this synonymy on two grounds, first that *B. obscura* is an untenable name since it is a homonym and secondly that *B. obscura*, even if it were a valid name, could not be *B. tenebrosa* since the two species are not at all comparable. The name *B. parva* Ruck. (q.v.) has been assigned to that species that previously had been called *B. obscura* and *B. tenebrosa* set off as a very distinct and individual species.

Through the fine cooperation of Mr. W. E. China of the British Museum it has been possible to come to the above conclusions. Apparently Walker, in describing the real *B. tenebrosa* had before him only one male specimen about the size of *B. carolinensis* (West.). No female specimens are mentioned and there are no cotypes, paratypes or duplicate specimens in the collections of the British Museum, where Walker's type specimen is deposited. Whether or not the type specimen was even used for comparison with specimens of American species is not known at this time. Probably it never had been, otherwise Distant and other authorities would certainly never have fallen into the error of considering such very different species as *B. obscura* and *B. tenebrosa* as the same thing.

In 1938 Dr. R. L. Usinger sent me, for identification purposes, seven specimens (two males and five females) of a species of *Brochymena* collected in 1933 near Tejupilco in Temescaltepec, Southwestern Mexico. These were all one species and so distinct from any others known by me at that time that they were described (1939) as *B. usingeri*. As a result of comparison with specimens in the British Museum, my species *usingeri* turns out to be the real *tenebrosa* or at the most a minor variety of it. Mr. China states that these two differ only in the size of the flange on the lateral surface of the clasper (*tenebrosa* having the larger) and the number of excavated piceous areas at the basal angles of the scutellum, *usingeri* possessing only one large pit there while Walker's type specimen has two. I believe that these are not sufficiently critical characters to warrant the retention of two different specific names. In all other important respects, *e.g.*, the facies of the male genital cup,

the nature of the scutellum, the milling of the lateral borders of the first two ventral abdominal segments, the total size, etc., the specimens called *usingeri* coincide with Walker's type of *tenebrosa*. Therefore *usingeri* is now being placed in synonymy.

For purposes of correcting errors of identification in pentatomid collections in this country the present author suggests that specimens labeled *B. tenebrosa* Walk. be reexamined and renamed if necessary. The following critical facts should be kept in mind. The real *B. tenebrosa* apparently comes from southern and southwestern Mexico and possibly northern Central American countries; no authentic specimens have ever been collected north of Mexico City. If specimens are less than 15 mm. long they are probably not *B. tenebrosa* as this species is as big or bigger than the well known *B. carolinensis*. The pronotal marginal teeth of *B. tenebrosa* are more than three in number, and are not sharp wide-spaced needle-like denticles; the lateral pronotal and propleural areas of this species are not tumidly swollen. In *B. tenebrosa* the basal third of the scutellum is flat-topped or truncated and the tip of the head is likewise truncated across its apex, there being a distinct rectilinear preapical sinus between the juga.

For purposes of the above redescription of *B. tenebrosa*, the critical characters of its synonymous *B. usingeri* were used.

Brochymena humeralis Ruckes, 1939 (Figs. 35, 39)

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxiv, p. 116, fig. 3, 1939.

Form broadly oval; color grayish yellow brown, shiny; not appreciably depressed and the dorsal surface faceted; the head as long before the eyes as wide just in front of them; sides of head converging to a subacute apex; subapical teeth not large, acute; the sinus acute; edges of the juga bend inwardly away from the margin of the head behind the subapical teeth; juga do not, or only slightly, extend beyond the tylus, their tips acute; apex of head narrowly triangular and subtruncate; the most striking character appears in the *protruding prominent humeri*; the lateral margin of the pronotum has a *well defined and deep antehumeral sinus*, the front edge of each humerus meeting the long axis of the pronotum almost at right angles; the apex of the humerus is acute and slightly produced; a short, rugose band of black pits cuts obliquely across the base of each humerus, marginal teeth of pronotum four to six in number, small and irregular with small ones interpolated; front margin of humerus with three retrorse serrations, the apex acute and

smooth; punctures of pronotum mixed in size; a pair of irregular, longitudinal, short bands of deep, large black pits extend across the highest points of the posterior half of the pronotal disc; basal portion of scutellum raised and quite convex but not tumid; punctures and pits of various sizes and mixed throughout; there is a band of deep corroded pits obliquely across each basal corner and some obsolescent dark, pitted vittae across the median third; the elevated portion continues posteriorly as a broad, short convex ridge, thicker than a carina; posterior half to two-thirds undulating; the frenum ends posterior to the middle of scutellar edge and the apical tongue is rather short; elytral punctures large and fewer basally becoming gradually finer and coalescing apically; numerous substellate white points and reticulations scattered over the surface; a discal point prominent; membrane hyaline with a fulvous tinge; veins and vermiculate markings bright reddish brown and without pale membranous borders; connexivum alternated dull yellow and brown; some fulvous punctures in the yellow band; incisures raised and pale; *posterior abdominal angles protruding and rectangular*; edge of buccula *shallowly sinuate* and ending in a stout acute tooth, tending to have a concave front edge; first and second antennal segments dull reddish brown, remaining ones darker brown becoming fuscous; segments two and three essentially subequal; segment four the longest; maculations of legs reddish brown to fulvous rather than fuscous; color design similar to allied species; fore tibiae stoutish slightly dilated apically giving a subclavate outline; metasternal evaporating area pale, orifice opens laterally; the crateriform base well elevated and auricle relatively short and dark and well raised above surrounding disc; ventral abdominal segments dull yellow with a scattering of rufous to fuscous punctures; pubescence sparse and silky pale; horse-shoe-shaped lateral designs on each abdominal segment obsolescent or inconspicuous; rostral groove long and shallow; beak reaching at least the front margin of the third visible segment; *inner narrow margins of basal valves of the female genital plates very narrowly upturned or reflexed*, so that, when valves are tightly closed, there appears to be a thin median carina between them.

Size: Female; 18 mm. long; 10 mm. across the humeri.

Described from five specimens, all female, collected by R. L. Usinger and H. E. Hinton at Bejucos and Tejupilco, Temascaltepec, Mexico, June 29th to July 5th, 1933.

Type: Female, Bejucos, Temascaltepec, Mexico, July 2nd, 1933.

Allotype: None is known.

Paratypes: Four females, Tejupilco, Temascaltepec, Mexico, June 29th and July 5th, 1933; two deposited in Museum, California Academy of Sciences, and two retained by the author.

Type locality: Bejucos, Temascaltepec, Mexico.

Type deposited: Museum, California Academy of Sciences, San Francisco, California.

Food plants: Unknown.

Distribution: Known only from the type localities.

Comments

The species is somewhat like *B. quadripustulata* with its prominent rectangular posterior abdominal angles; like *B. carolinensis* with its faceted dorsal surface and prominent humeri which in *B. humeralis* are still larger producing the effect of a pair of epaulets covering the shoulders; like *B. cariosa* with its acute juga and compound carina-like ridge between the basal valves of the female genital plates. To which one of the above species *humeralis* is most closely related is impossible to say without the existence of male examples.

Brochymena affinis Van Duzee, 1904 (Figs. 7, 36, 40)

Van Duzee, Trans. Amer. Ent. Soc., v. xxx, p. 29, 1904.

Van Duzee, Cat. Hemip. N. A., p. 31, 1917.

Parshley, University of Michigan, Occ. Papers, No. 71, p. 7, 1919.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 206, 1939.

Very closely allied to *4-pustulata* (Fabr.); differing principally from that species in having the genital segment of the male very short and broad, extending on either side beyond the sixth ventral segment and beyond the projecting apex of the membrane, and heavily fringed with long pale hairs either side of the median sinus. Two basal joints of the antennae rufous, the remaining joints black with rufous incisures, second joint nearly or quite as long as the third, fifth a little shorter than the preceding. Head about as in *4-pustulata* but with the tylus scarcely shorter than the cheeks. Sides of the pronotum distinctly rounded and strongly toothed before the sinus. Scutellum perhaps a little broader and more rounded at tip than in *4-pustulata*. Rostrum reaching to the middle of the third ven-

tral segment, pale with a black tip and median line within. Other characters substantially as in *4-pustulata*. The general color, however, seems to average somewhat lighter.

Length: 13–16 mm., width across the humeri 7–8 mm.

Redescription

Form broadly oval, subdepressed, dorsal surface faceted; color dark cinereous to dark fuscous. Head about as wide before the eyes as long from there to apex; dorsal surface somewhat undulant; margins before the eyes concave and weakly converging anteriorly; subapical teeth prominent, rectilinear to acute and their sinuses deep and rectilinear to obtuse; juga slightly longer than the tylus, narrowly overlapping the latter and leaving a small rectangular preapical sinus; apex of head narrowly arcuate; pronotum very undulant, area of the calli well raised and irregular surfaced; laterally a pale, calloused arcuate bar runs parallel to the dentate edge of the pronotum; a deep circular impressed area in the disc at the base of each humerus; a pair of corroded clusters of deep dark pits behind each callus; posterior portion of pronotal disc with smaller and more regular punctures; humeri not exceptionally produced and the humeral angle is rectilinear, frontal edge weakly serrate; dentate margin strongly arcuate and its teeth large and usually blunt, almost crenulate; basal third of scutellum raised, its sides declivitous and its dorsal surface flat or truncated, sometimes weakly concave; continued posteriorly as an obsolescent broad ridge; scutellum strongly pitted on base and at basal angles, the punctures becoming smaller and more shallow apically; elytral punctures small, uniform and evenly distributed; connexivum alternated as in allied species, with two piceous and one reddish band on each segment, the latter tending to become paler at the margin and provided with a few scattered piceous punctures; vermiculate markings of membrane slightly darker than arborescent ones; marginal fuscous border prominent; underside of head obscurely mottled with more dark than pale; buccular edge sinuate apically and ending in an acute tooth the frontal edge of which is somewhat sigmoid; basal two antennal segments rufous, other piceous; segments two and three subequal, three perhaps slightly longer; sternal and pleural area about equally punctured with fuscous, *i.e.*, no striking division of color between the two areas; a crescentic groove beneath the marginal teeth prominent, but its adjacent

nearly impunctate area usually fuscous rather than darker as in many other species; femora heavily speckled with black, the spots arranged in obscure longitudinal vittae which become congested apically; an incomplete subapical pale annulus present; pale annulus of fore tibia with only a few small black spots in its middle on the frontal surface instead of a square patch there; all tarsi concolorous piceous or nearly so; metasternal evaporating area contrastingly pale, ostiole opening laterally and its auricle long and ending acutely; venter testaceous with numerous scattered piceous punctures which coalesce laterally to form dark lunes on each segment, frequently each lune is incomplete, being broken at its middle; median furrow shallow but evident; lateral border of each abdominal segment transversely rugose so that entire ventral abdominal margin appears to be milled; basal valves of female genital plates with basolateral corners acutely produced; a darker triangular patch of color between the two basal plates apically; male genital cup with lateral tips produced into blunt finger-like processes, vestiture strong and heavy.

Cotypes: Two male and six female specimens.

Type localities: Palo Alto, California; Moscow, Idaho; Olympia, Washington.

Types deposited: Van Duzee Collection, Museum, California Academy of Sciences, San Francisco, California.

Food plants: Unknown; probably species of pines throughout the range.

Distribution: Washington, Oregon, California, Idaho, Nevada, Utah, Colorado.

Comments

This and the next species (*hoppingi*, q.v.) are very close relatives as is evident from a study of their general appearance, diagnostic characteristics and comparison of their genitalia.

Although in the original description Van Duzee compares this species with *quadripustulata* it is very apparent that there is no direct phylogenetic relationship between the two. The probable reason for Van Duzee making the comparison lies in the fact that in 1904 when he described *affinis* as new there were only eight other species in the genus recognized, of which *quadripustulata* was the best known and the one which at that time most resembled the proposed *affinis*. Further study of both *affinis* and *hoppingi* will prob-

ably show that there is closer relationship between these two and *carolinensis* than between them and any other species.

Males of both *affinis* and *hoppingi* are readily distinguishable from all others by the presence of blunt finger-like extensions of the lateral tips of the genital segments. In the females the differentiating characters are a bit more subtle and difficult to distinguish. One must rely on such distinctions as are to be found in the basal valves of the genital plates, the crenulation of the pronotal margin, and the flat-topped, almost truncated appearance of the basal third of the scutellum. In the matter of the basal valvular plates, there is an evident acute lateral angle on each plate that differentiates these species from others wherein the homologous angle is usually less acute or may appear merely as a rounded obtuse corner. Furthermore a line drawn between the two lateral angles and across the posterior marginal edges of the combined basal plates forms a pronounced arc, whereas in most other species the arc is more shallow and in some cases, like *dilata*, becomes a straight line.

The pronotal marginal dentations are more nearly crenulations than they are pointed teeth and, with the exception of *tenebrosa*, *affinis* and *hoppingi* are the only two species that have a pronounced flat-topped basal third on the scutellum. This portion is well raised and its sides are declivitous but the dorsal surface is all in one plane.

The transversely rugose borders of all of the ventral abdominal segments, more than any other character, distinguishes *affinis* and *hoppingi* from other species in the genus.

Brochymena hoppingi Van Duzee, 1921 (Fig. 41).

Van Duzee, Proc. Calif. Acad. Sci., v. xi, No. 10, p. 111, 1921.

Ruckes, Bull. Bklyn. Ent. Soc., v. xxxii, No. 1, p. 33, 1937.

Torre-Bueno, Entomologica Americana, v. xix, No. 3, p. 205, 1939.

†*myops*, Ruckes, Bull. Bklyn. Ent. Soc. v. xxxii, No. 1, p. 33, 1937.

Male: Head slightly longer than broad across the eyes; cheeks overlapping tylus, sometimes almost contiguous at apex; subapical angle obtuse or rounded; second antennal segment two-thirds length of third. Sides of pronotum with about five rounded teeth on anterior lobe, the humeral lobe rounded anteriorly as in *affinis* but scarcely crenulate, humeral angle less prominent; surface deeply punctured and sculptured, the callosities more prominent than in *affinis*. Scutellum a little shorter, scarcely raised at base, median line subcarinate, surface

more deeply pitted than in *affinis*. Elytra closely and quite evenly punctured with a few calloused points. Rostrum passing the middle of the third ventral segment; venter nearly smooth with small, scattering obsolete punctures, sulcus shallow, but obvious. Genital segment of male greatly extended either side as in *affinis*, their apices distinctly passing line of sixth abdominal segment, hind margin heavily bearded.

Color variable, mostly black, testaceous interspaces less conspicuous; lateral crenulations of pronotum rufous; membrane with but few vermiculate marks; femora with pale subapical mark and median annulus more or less distinct; antennal incisures very narrowly rufous; connexivum with small marginal spots and the incisures rufous, the median line of the venter narrowly rufous.

Female: Larger with pale margins a little more conspicuous, especially near the apex of the scutellum and on venter.

Size: Male; 12 mm. long. Female; 14 mm. long.

Holotype: Male #749.

Allotype: Female #750.

Paratypes: Four males and four females.

Type locality: Vallecito Co., California, April 18, 1919.

Types deposited: Museum, California Academy of Sciences, San Francisco, California. One paratype is deposited in the Canadian National Collection, Ottawa, Canada.

Food plants: Ponderosa pine (*Pinus brachyptera* Englm.) Douglas spruce (*Pseudotsuga mucronata* (Raf.)). Probably on other species as well.

Distribution: California, Arizona, Utah, Colorado, New Mexico.

Comments

In addition to the characteristics mentioned by Van Duzee in the original description, I would add the following which are features in common with the preceding species, *affinis*: form broadly oval, subdepressed; the border of the lateral portion of each ventral abdominal segment is transversely rugose causing the entire abdominal margin to appear as if it is milled; the pale annulus of the fore tibia is provided only with a few black spots rather than a distinct square patch on its frontal surface; the base of the scutellum tends to be flat-topped or indeed in *hoppingi* more frequently concave; and the basal lateral angles of the basal plates of the female genital valves are acutely produced.

To differentiate between the species *affinis* and *hoppingi* we have to rely on color differences primarily, the average smaller size of the latter, the more obtuse subapical tooth and the more concave base to the scutellum of the latter. In the male of *hoppingi* there is a slightly deeper and wider sulcus across the apical border of the genital cup above the vestiture, and the blunt finger-like lateral extensions diverge slightly more, so that the V-shaped border, as seen ventrally, is more shallow than in *affinis*.

This appears to be a rather common species in the Jemez Mountains of New Mexico.

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PLATE I

- Fig. 1-A. *Brochymena lineata* Ruckes. Abbreviations: PAS: preapical sinus; JUG: jugum; TYL: tylus; SAT: subapical tooth; CAL: callus; M.T.: marginal teeth; AHS: antehumeral sinus; HUM: humerus; FEM: femur; TIB: tibia; TAR: tarsus; SCUT: scutellum; ELYT: elytron or hemelytron; DIS. P.: discal point; antennal segments are numbered from 1 to 5.
- Fig. 1-B. Side view of head of *B. quadripustulata* (Fabr.) Abbreviations: ANT. P.: antennal pedicel; BK.: beak or rostrum; BUC.: buccula; BUC. T.: buccular tooth; JUG.: jugum.
- Fig. 2. Left clasper, ental view, *B. arborea*.
- Fig. 3. Right clasper, ectal view, *B. sulcata*.
- Fig. 4. Right clasper, ectal view, *B. cariosa*.
- Fig. 5. Right clasper, dorsal view, *B. punctata*.
- Fig. 6. Right clasper, dorsal view, *B. carolinensis*.
- Fig. 7. Right clasper, ectal view, *B. affinis*.
- Fig. 8. Left humerus, *B. cuspidata*.
- Fig. 9. Left humerus, *B. arborea*.
- Fig. 10. Left humerus, *B. quadripustulata*.
- Fig. 11. Tibia, *B. haedula*.
- Fig. 12. Tibia, *B. arborea*.
- Fig. 13. Tibia, *B. poeyi*.

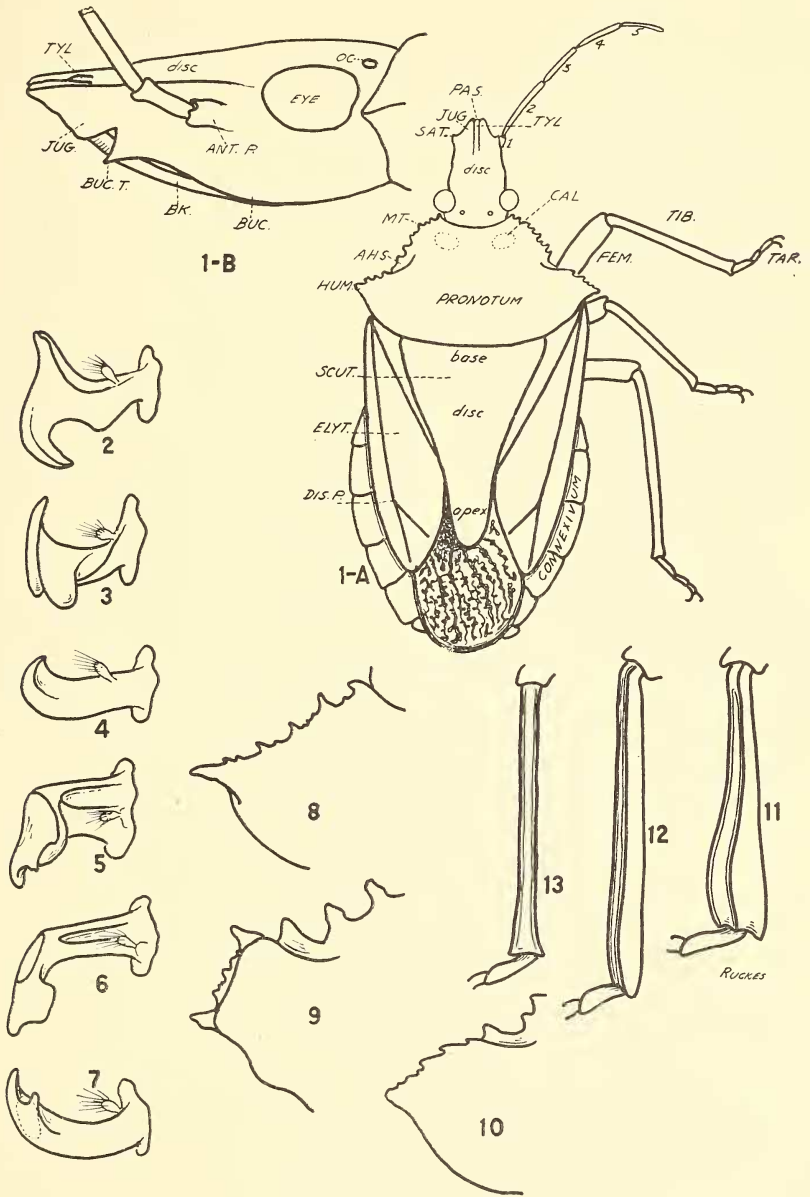


PLATE II

Figs. 14, 16, 17, 19, 21, 22, and 23. Dorsal aspects of heads.

Figs. 15, 18, 20. Left claspers, ental aspect.

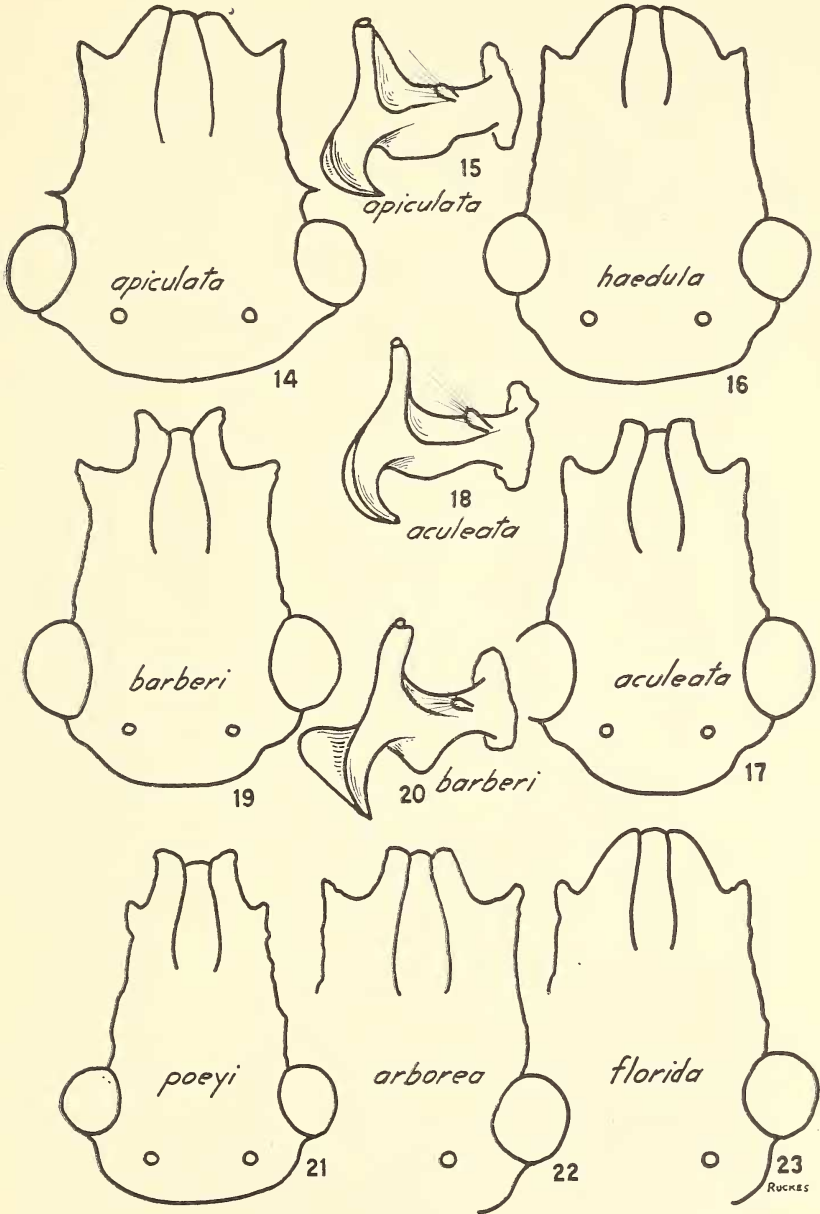
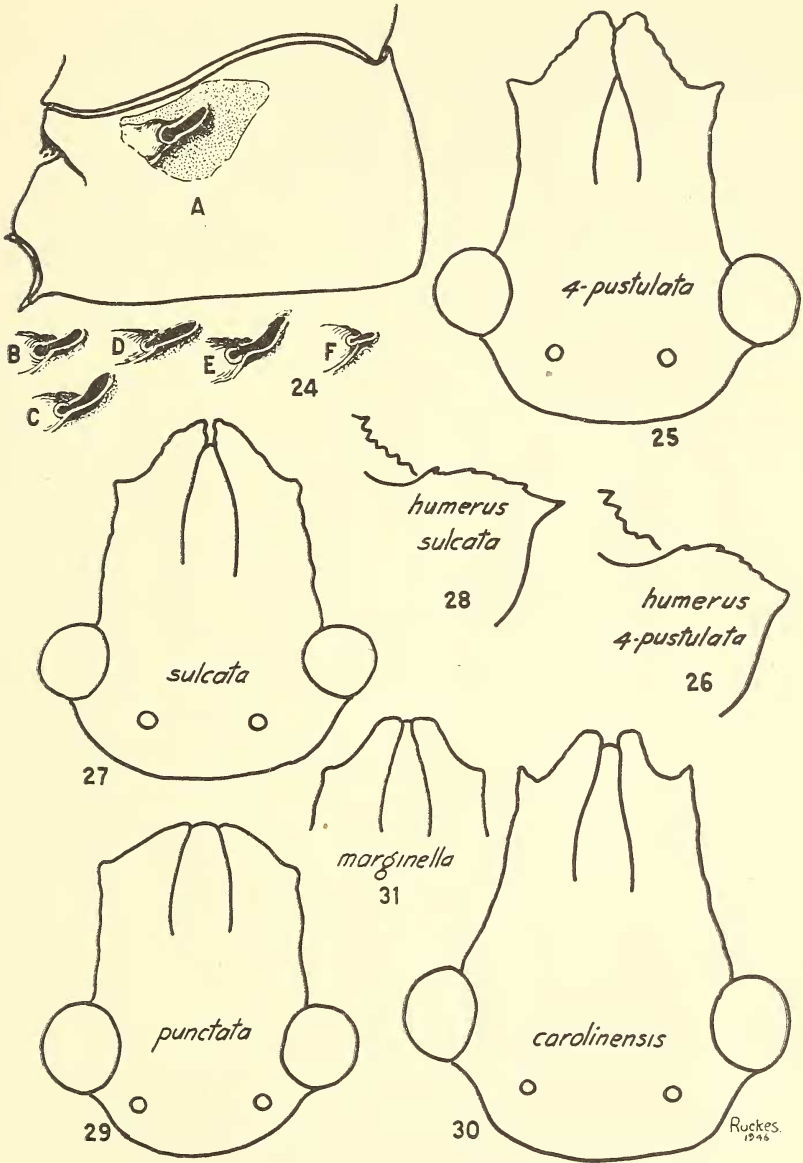
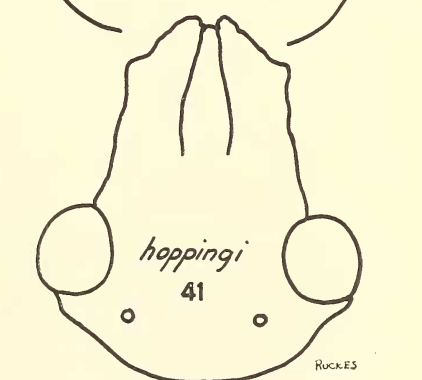
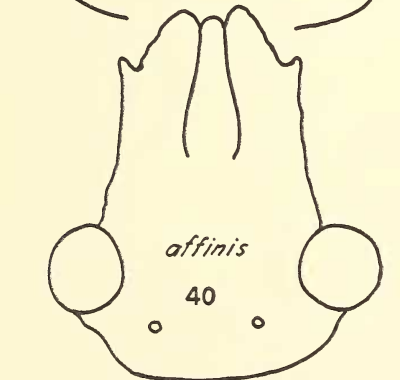
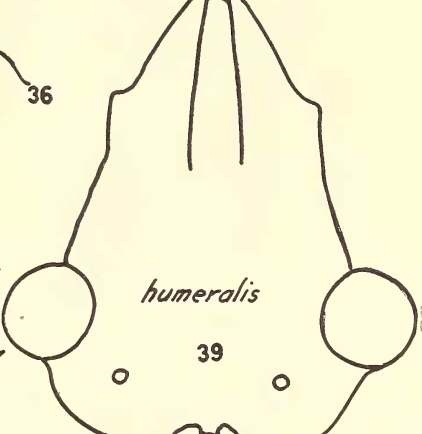
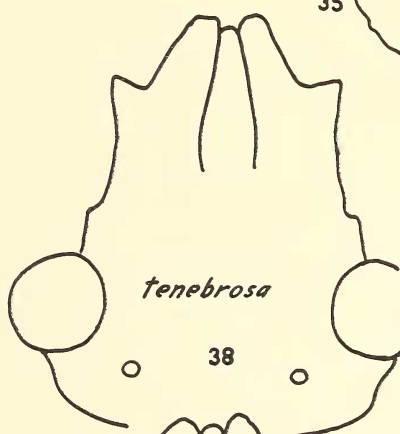


PLATE III

- Fig. 24-A. Left metasternal plate, *B. cariosa*, showing crateriform base, orifice and auricle of stink gland, surrounded by subtriangular evaporating area.
- 24-B. Base and auricle, *B. quadripustulata*.
- 24-C. Base and auricle, *B. sulcata*.
- 24-D. Base and auricle, *B. dilata*.
- 24-E. Base and auricle, *B. tenebrosa*.
- 24-F. Base and auricle, *B. lineata*.
- Figs. 25, 27, 29, 30, 31. Dorsal aspects of heads.
- Figs. 26, 28. Right humeri.





RUCKES

A CHECK LIST OF THE SPECIES

cuspidata GROUP		
<i>B. cuspidata</i> Distant	1900	Page 155
arborea GROUP		
<i>B. apiculata</i> Van Duzee	1923	“ 158
<i>B. haedula</i> Stål	1862	“ 158
<i>B. aculeata</i> Distant	1889	“ 158
<i>B. barberi</i> Ruckes	1939	“ 159
<i>B. barberi</i> var. <i>diluta</i> Ruckes	1939	“ 159
<i>B. poeyi</i> Guérin-Ménéville	1857	“ 159
<i>B. arborea</i> (Say)	1825	“ 159
<i>B. florida</i> Ruckes	1939	“ 159
quadripustulata GROUP		
<i>B. pilatei</i> Van Duzee	1934	“ 180
<i>B. quadripustulata</i> (Fabr.)	1775	“ 180
<i>B. sulcata</i> Van Duzee	1918	“ 180
<i>B. cariosa</i> Stål	1872	“ 181
<i>B. lineata</i> Ruckes	1938	“ 181
<i>B. parva</i> Ruckes	1946	“ 181
= <i>obscura</i> (H.-S.) 1839		
<i>B. punctata</i> Van Duzee	1909	“ 182
<i>B. punctata</i> var. <i>pallida</i> Blatchley	1926	“ 182
<i>B. dilata</i> Ruckes	1938	“ 182
<i>B. myops</i> Stål	1872	“ 183
<i>B. carolinensis</i> (Westwood)	1837	“ 183
<i>B. marginella</i> Stål	1872	“ 183
<i>B. tenebrosa</i> Walker	1867	“ 184
<i>B. humeralis</i> Ruckes	1939	“ 184
<i>B. affinis</i> Van Duzee	1904	“ 184
<i>B. hoppingi</i> Van Duzee	1921	“ 184